

# **KCOMBO-7**

## **OPERATOR'S MANUAL**

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**GPS CHART PLOTTER WITH FISHFINDER**

# SAFETY INSTRUCTIONS

## Safety Instructions for the Operator

### WARNING

**Do not open the equipment.**

Only qualified personnel should work inside the equipment.

**Do not disassemble or modify the equipment.**

Fire, electrical shock or serious injury can result.

**Immediately turn off the power at the switchboard if the equipment is emitting smoke or fire.**

Continued use of the equipment can cause fire or electrical shock. Contact a **ONWA** agent for service.

**Use the proper fuse.**

Use of a wrong fuse can damage the equipment or cause fire.

**Be sure the power supply is compatible with the equipment.**

Incorrect power supply may cause the equipment to overheat.

**The useable temperature range  
-15°C to 55°C for the display unit.**

Use of the equipment out of those ranges may damage the equipment.

## Safety Instructions for the Installer

### WARNING

**Do not open the cover unless totally familiar with electrical circuits and service manual.**

Improper handling can result in electrical shock.

**Turn off the power at the switchboard before beginning the installation.**

Fire or electrical shock can result if the power is left on.

**Be sure that the power supply is compatible with the voltage rating of the equipment.**

Connection of an incorrect power supply can cause fire or equipment damage.

**Use the proper fuse.**

Use of a wrong fuse can damage the equipment or cause fire.

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# FOREWORD

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The KCOMBO ONWA GPS PLOTTER aid are specially designed for the vessel traffic management, ONWA is a professional brand of the domestic and foreign navigation products.

The products are designed to be all-sealed and waterproof, can be rapid position-fixing and resistant to poor environment. The software is powerful by using the advanced ARM9 processors, can be capable to display faster, and the design for operation is professional and reasonable, can be easy to use. The built-in Large-capacity map storage space provides intuitive and accurate indication to navigation. It's applicable to the navigation and position-fixing of various vessels at sea and rivers, as well as the hydrographic information collection, river management, etc. For the application for different types of the products please refer to the following:

## FEATURES

- Easy to operate
- Ultra high brightness LCD, viewable under strong sunlight
- Compatible with dual mapping system,C-MAP NT MAX and ONWA K-Chart
- Built-in GPS antenna, external antenna can be used as an option
- Digital HD fishfinder technology
- Built-in commercial fishfinder module which is widely using in worldwide commercial fishing boat
- IPX7 waterproof panel

# MAIN PERFORMANCE AND SPECIFICATIONS

## Plotter Characteristics

Waypoints/icons	12000 user waypoints with name, symbol. 3 system waypoints: MOB, Start , Cursor 10 proximity waypoints
Routes	Max 30 routes. And up to 170 points for each one
Tracks	8000 points automatic track log; 10 saved tracks (up to 8000 track points each). Let you retrace your path in both directions
Alarms	XTE, Anchor drag, arrival, speed, voltage, proximity waypoint and time,AIS alarm.
Palette	Normal Daylight exposed to sunlight Night in dark environment NOAA paperchart colors
Tides	Tide data
Projection	Mercator projection
Position format	Degree of minutes and UTM
Basemap	Built-in Onwa K-Chart
External Map	SD Cards slot for C-Map MAX and ONWA K-Chart
User data storage	Internal backup of user settings, or external SD-card
Plot Interval	5s to 60min 0.01nm to 10nm Automatic way
Plotting scales	0.001nm to 1000nm
Nav Data	Inputs: \$--GGA, \$--GLL,\$--GSA, \$--GSV, \$--RMC, \$--VTG, \$--ZDA, \$--VWR,\$--VWT,\$--MWD, \$--VPW Outputs: “GGA” , “GLL” , “RMC” , “AAM” , “APA” , “APB” , “BOD” , “BWC” , “BWR” , “DBT” “DPT” , ” HDT” , “MTW” , “RMB” , “TLL” , “VTG” , “WPL” , “XTE” , “ZDA” , “ZTG” , “ZDL” , “MWD” , “VPW” , “VWR” , “VWT” , Outputs for autopilot: \$--APB,\$--BOD,\$--XTE,\$--APA
Perspective View	On/off
Celestial	Sunrise/Sunset      Moonrise/Moonset



## Power Supply

10.5 to 35VDC, current drain<1.0A at 12V

## Physical

Size: 243mm(H)X155mm(W)X82mm(D)  
Weight: 0.6kg  
Display: 7-inches ColorTFT day-view LCD 800×600 pixels  
Input & Output Port: one opto-isolated input Port  
one RS232 Output Port  
Waterproofing: Display unit: IPX5  
Temperature range: Display unit: -15°C to +55°C  
Antenna unit: -25°C to +70°C

## GPS Receiver Characteristics

Receiver: 50 parallel channel GPS receiver continuously tracks and uses up to 50 satellites to compute and update your position  
Acquisition time: Cold start: 60 seconds average  
Hot start: 45 second average  
Update rate: 1/second,continuous  
Position: 2.5 meters(95%) without S/A  
Velocity: 0.1 meter/sec without S/A  
Time: 100ns synchronized to GPS time  
Dynamics: Altitude: 50,000m Max  
Velocity: 500 m/s  
Acceleration: 4g Max  
Datum: WGS 84 and user define

## Equipment List

Standard

1. Display unit
2. Operator manual
3. Installation materials and standard spare parts

## AIS interface

Data input: NMEA 0183, RS232

Baud rate: 38,400

## Option Accessories

1) GPS antenna KA-07

2) Transducers

Dual Frequency Thru-Hull Transducer

- 600W Bronze NMM40-50/200

- 600W Plastic NBM40-50/200

- 600W Airmar Bronze Transducer w/Temp seosor B45

Dual Frequency Transom Mount Transducer

- 600W Onwa Transducer w/Temp seosor KTD-520\_TM

- 600W Airmar transducer w/Temp seosor P58

3) Temperature seosor

Onwa Thru-Hull temperature seosor KTS-10K\_TH

Onwa Transom Mount Temperature seosor KTS-10K\_TM

## HD Fishfinder Characteristics

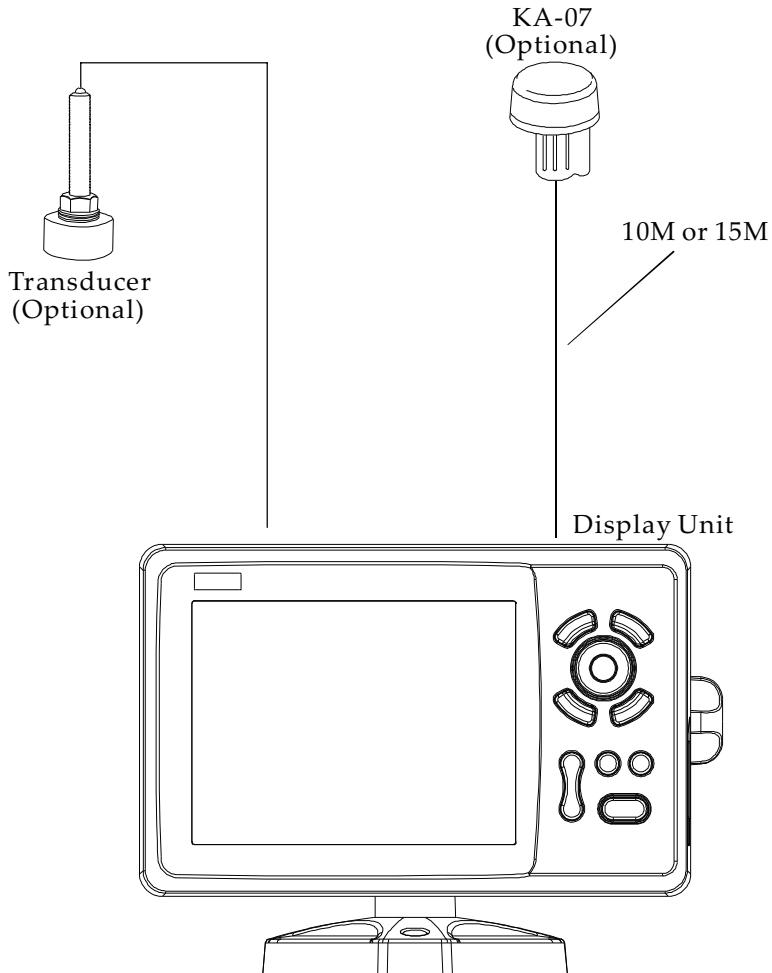
Echo Color	16 colors (including background color) according to echo intensity. The background color is selectable from blue, light blue, white and black.
Basic Range	Meters 5/10/20/40/80/150/200/300/600/1000 Feet 15/30/60/120/200/400/600/1000/2000/3000 Fathoms 3/5/10/20/40/80/100/150/300/600
Range Shift	80 meters, 200 feet, 100fathoms
Zoom Range	Times 2,3,4,6
Bottom Lock Expansion	5/10meters,10/20feet, 2/5fathoms
Auto Mode	Automatic adjustment of range and gain
Display Mode	High Frequency (200KHz),Low Frequency (50KHz), Dual (200K and 50K 1/2display on each), Zoom (200KHz and 50KHz zoom) and A-scope Display
Zoom Display	Marker Zoom, Bottom Zoom and Bottom-lock Expansion
Display Advance Speed	Lines/TX:Freeze,1/8,1/4,1/2,1/1,2/1
TX Frequency	50 and 200kHz (alternately transmitted)
Power Output	600W
Pulse-length/TX rate	

Display End Depth (m)	5	10	20	40	80	150	200	300	600	1000
Pulse-Length (ms) 200K	0.12	0.22	0.32	0.52	0.92	1.02	1.02	1.02	1.02	1.02
Pulse-Length (ms) 50K	0.17	0.27	0.37	0.57	0.97	1.07	1.07	1.07	1.07	1.07
TX Rate (Pulse/min)	2400	1500	857	444	231	125	95	63	38	30

Interference Rejecter	Rejects unwanted signals by comparing last and present echoes in strength.
Alarm	Fish and Bottom alarms, Temperature alarm (sensor required)

# CONFIGURATION

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## 1.2 Turning ON and OFF Power

### Turning on the power

Press the [⏻/☀] key. The unit beeps and displays the "ONWA" logo. After a few seconds, it starts up with the last used display mode.



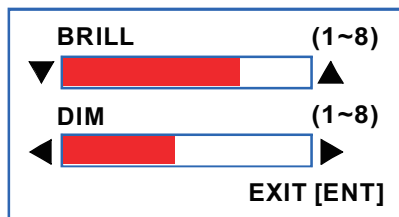
### Turning off the power

Press and hold down the [⏻/☀] key until the screen goes blank (about four seconds).

## 1.3 Adjusting Brilliance and DIM

You can adjust display brilliance as shown below.

1. Press the [⏻/☀] key. The adjusting window appears.

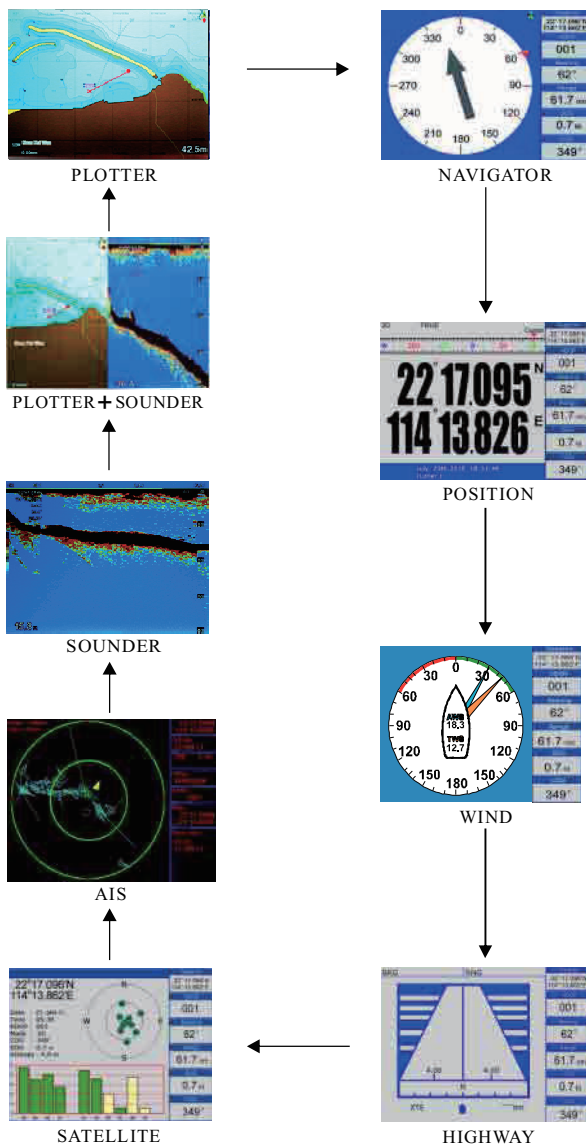


2. Press [▲] or [▼] to adjust LCD display brightness.
3. Press [▶] or [◀] to adjust keypad backlight.
4. Press the [ESC] key to confirm and exit.

## 1.4 Display Modes



Your unit has eleven display modes: PLOTTER SCREEN, NAVIGATOR SCREEN, WIND SCREEN, POSITION SCREEN, SATELLITE SCREEN, HIGHWAY SCREEN, AIS SCREEN, SOUNDER SCREEN and PLOTTER + SOUNDER SCREEN.

Press the **[MODE]** key to choose a display mode. Each time the key is pressed, the display mode changes in the sequence shown below.








## 2. PLOTTER DISPLAY OVERVIEW

### 2.1 Choosing the Zoom Display Range

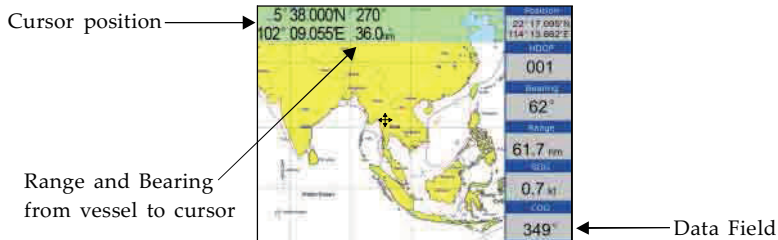
You may press  to Zoom In and  to Zoom Out as desired **on the PLOTTER** display.

### 2.2 Moving the Cursor

Press the cursor pad to move the cursor. The cursor moves in the direction of the pressed arrow. Whether up [, down [, left [, right [] or diagonal [].

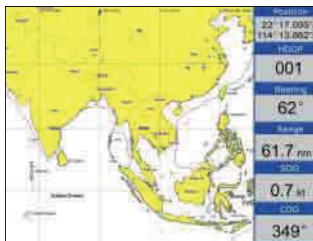
#### Cursor Position Turned On

Cursor position is displayed in latitude and longitude at the top left corner of the **PLOTTER** display when the cursor is on. The range and bearing from own ship to the cursor appears at the top left corner of the display too.



#### Cursor Position Turned Off

Press the [ESC] key to clear the cursor. Cursor position data will disappear when the cursor is off.





## 2.3 Panning the PLOTTER Display

Using the cursor, pan left, right, up or down on your desired area. Place the cursor at the edge of the screen to start panning. The display shifts in the direction opposite to cursor pad operation.

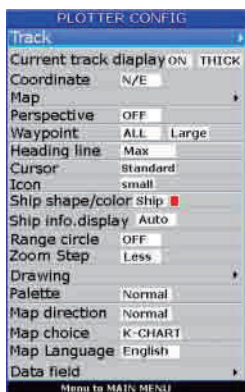
## 2.4 Centering Own Ship's Position

Press the [ESC] key for centering own ship's position.

## 2.5 Coordinates

Coordinate Systems are ways of splitting up the world in order to form transferable units (numbers) that relate to points on a map.

1. Press [MENU] key in PLOTTER screen.



2. Choose **Coordinates** and then press [ENT] key to select.



3. Choose "N/E" or "UTM" as desired then press [ENT] key to finish.

## 2.6 Map

1. Press [MENU] key in PLOTTER screen.
2. Choose **Map** and then press [►] key to select.
3. Choose the layer "ON" or "OFF" as desired and then press [ENT] key to finish.

MAP			
Deep point	ON	Water line	ON
Obstructions	ON	Help info.	ON
Danger	ON	Limit zone	ON
Place names	ON	Depth line 20m	ON
Port names	ON	Depth line 10m	ON
Light	ON	Route line	ON
Communication	ON	Depth area 2m	ON
Reference points	ON	Depth area 5m	ON
Dock	ON	LAT / LON grid	ON
Light line	ON	ALL	ON

(K-Chart)

MAP			
Place names	OFF	Roads	OFF
Name tags	OFF	POI	OFF
Nav aids & Light	OFF	Lat/Lon grid	OFF
Attention area	OFF	Chart boundaries	OFF
Tides & Currents	OFF	Value-added data	OFF
Seabed type	OFF	Chart lock	OFF
Ports & Services	OFF	Underwater obj.	0000m
Track & Routes	OFF	Rocks	OFF
Depth range Min	0000m	Obstructions	OFF
Depth range Max	0000m	Diffusers	OFF
Land elevations	OFF	Wrecks	OFF
Land elev. Values	OFF	ALL	OFF

(C-MAP)

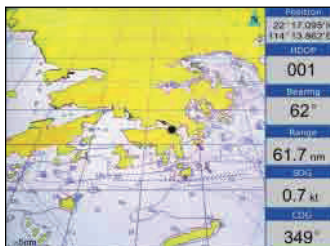
## 2.7 Perspective View

1. Press [MENU] key in PLOTTER screen.
2. Choose **Perspective** and then press [ENT] key to select.

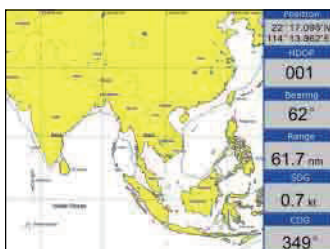
PLOTTER CONFIG			
Track	▶		
Current track display	ON	THICK	
Coordinate	N/E		
Map	▶		
Perspective	OFF		
Waypoint	OFF	Large	
Heading line	ON		
Cursor	Standard		
Icon	small		
Ship shape/color	Ship		
Ship info. display	Auto		
Range circle	OFF		
Zoom Step	Less		
Drawing	▶		
Palette	Normal		
Map direction	Normal		
Map choice	K-CHART		
Map Language	English		
Data field	▶		
Menu to MAIN MENU			

3. Choose "ON" or "OFF" as desired and then press [ENT] key to finish.

4. Choose the layer "ON" as desired and then press [ENT] key to finish.

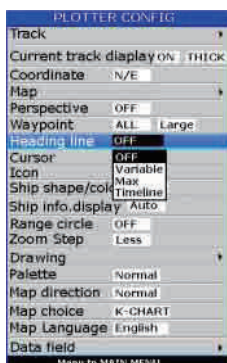


5. Choose the layer "OFF" as desired and then press [ENT] key to finish.



## 2.8 Heading Line

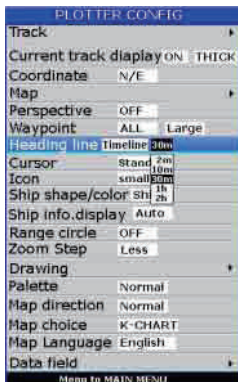
1. Press [MENU] key in PLOTTER screen.
2. Choose **Heading Line** and then press [ENT] key to select.



3. Choose "Off", "Variable", "Max" or "Timeline" as desired and then press [ENT] key to finish.

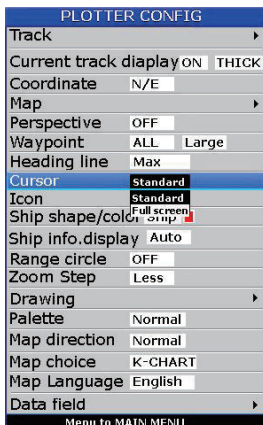
#### 4. Heading Line option: "COG Time Line" selection

The length of heading line will vary according to the SOG to show the estimated point of destination after the set period. Example, if you set the COG Time Line to 10 minutes then the length of the heading line will point to the position that your boat will reach after 10 minutes.



## 2.9 Cursor

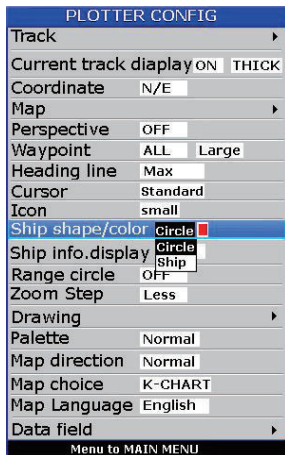
1. Press [MENU] key in PLOTTER screen.
2. Choose **Cursor** and then press [ENT] key to select.



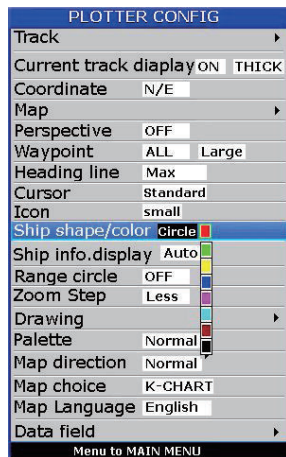
3. Choose "Standard" or "Full Screen" as desired and then press [ENT] key to finish.

## 2.10 Ship shape/color

1. Press [MENU] key in PLOTTER screen.
2. Choose **Ship shape/color** and then press [ENT] key to select.

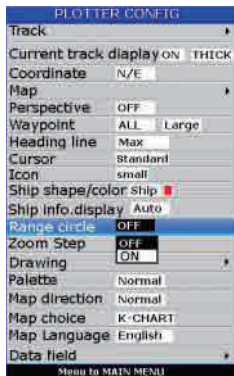


Press [▶] key  
and then press  
[ENT] key.



## 2.11 Range Circle

1. Press [MENU] key in PLOTTER screen.
2. Choose **Range Circle** and then press [ENT] key to select.



3. Choose "ON" (if you choose "ON", you need to input the radius of the circle manually), or "OFF" as desired and then press [ENT] key to finish.

## 2.12 Drawing

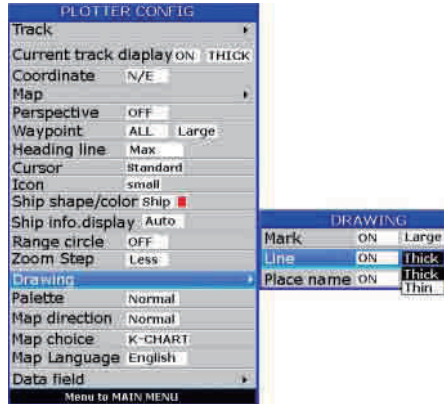
1. Press [MENU] key in **PLOTTER** screen.
2. Choose **Drawing** and then press [ENT] key to select.



3. Choose "Mark", "Line" or "Place name" as desired and then press [ENT] key to finish.
4. User can change the size of User Marks.

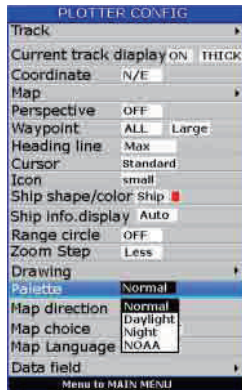


5. User can change the size of Drawing Lines.



## 2.13 Palette

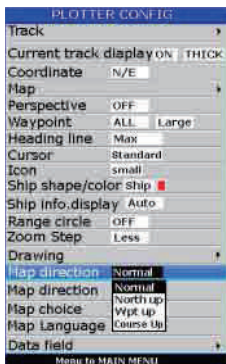
1. Press [MENU] key in **PLOTTER** screen.
2. Choose **Palette** and then press [ENT] key to select.



3. Choose "Normal", "Daylight", "Night" or "NOAA" as desired and then press [ENT] key to finish.

## 2.14 Map Direction

1. Press [MENU] key in PLOTTER screen.
2. Choose **Map Direction** and then press [ENT] key to select.



3. Choose "Normal", "North Up", "WPT Up" or "COURSE Up" as desired and then press [ENT] key to finish.

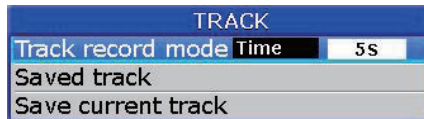


## 3. TRACK

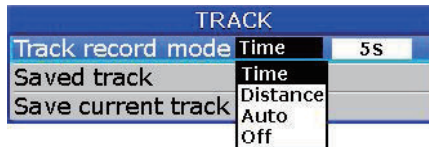
### 3.1 Changing Track Plotting Interval, Stop Plotting

When the track memory becomes full, the oldest track is erased to make room for the latest.

1. Press the [MENU] key twice to enter main menu.
2. Choose **Track record** and then press [►] key to select.



3. Choose Track record mode and then press [►] key select.



4. Choose "Time", "Distance", "Auto" or "Off".

Time: Track is recorded and plotted at the time interval set.

Distance: Track is recorded and plotted at the distance interval set.

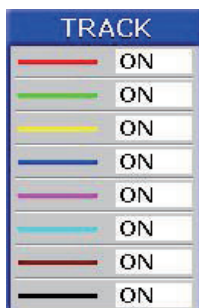
Auto: Plotting and recording interval changes with display range selected.

Off: Track is neither recorded nor plotted.

5. For Time and Distance, enter the recording interval as follows:
  - a) Press the [►] key to choose "5s", "10s", "30s", "1min", "5min", "10min", "30min" or "60min".
  - b) Use [▲] or [▼] to select value.
6. Press [ENT] key to finish.

## 3.2 Displaying the Track

1. Press [MENU] key in **PLOTTER** screen.
2. Choose **Track** and then press [►] key to select.



3. Choose the color and if you want to turn it "ON" or "OFF".
4. Press [MENU] key to finish.

## 3.3 Creating Track Data

1. Press the [MENU] key twice to enter main menu.
2. Choose **Track Record** and then press [►] key to select.
3. Choose **Save Current Track** and then press [ENT] key.

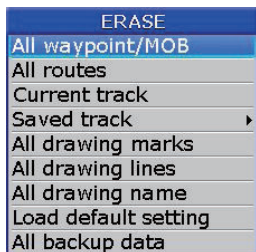
The following window will appear.

SAVE CURRENT TRACK	
Name : <input type="text"/>	No. : <input type="text" value="OFF"/>
Start : 5°38.000'N	End: 5°38.000'N
102°45.200'E	102°45.200'E
Distance : 0.0nm	Points : 182
Date : --	
Save ?	Exit ?

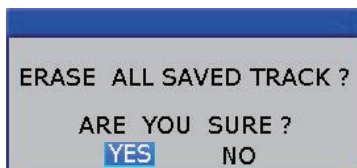
Track Data can be used for navigation.

### 3.4 Erasing Track

1. Press [MENU] key twice to enter main menu.
2. Choose **Erase** and then press [►] key to select.



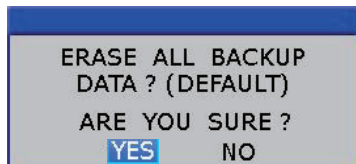
3. Choose **Current track** or **Saved track**.
4. If **Saved track** is chosen, press [►] key to choose the color that you want to erase or choose **ALL** if you want to erase all tracks and then press [ENT] key. The following window will appear:



### 3.5 Erasing All Backup Data

1. Press [MENU] key twice to enter main menu.
2. Choose **Erase** and then press [►] key to select.
3. Choose **All backup data** and then press [ENT] key.

The following window will appear.



## 4. WAYPOINT/MOB

### 4.1 Entering Waypoints

Waypoints can be entered on the **PLOTTER** display in three ways: by cursor position, at own ship's position, and from the waypoint edit.

#### Entering a waypoint with the cursor

1. Use the cursor pad to place the cursor on the location desired for a waypoint.
2. Press the [ENT] key. The following window appears.

CURSOR POS → WPT

NAME: 006 MARK

24°39.936'N

124°39.936'E

05-AUG-10 00:00

TTG: 00H00M ETA: 00:00

SAVE QUIT

3. This window is where you can rename, edit LON and LAT, choose mark shape and color, and enter a comment.
4. Choose "SAVE" to finish.

#### **Entering a waypoint at own ship's position**

1. Momentarily press [ENT] key when no cursor is seen.  
The following window appears.

GPS POS → WPT

NAME: 006 MARK

24°39.936'N

124°39.936'E

05-AUG-10 00:00

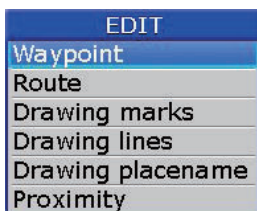
TTG: 00H00M ETA: 00:00

SAVE QUIT

2. If you do not need to change anything, choose "SAVE" to finish.

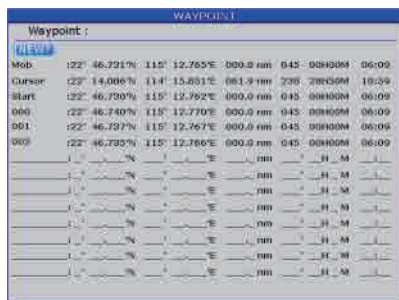
## Entering a waypoint from the waypoint list

1. Press the [MENU] key twice to enter main menu.
2. Choose **Edit** and then press [►] key to select.



3. Choose **Waypoint** and then press [ENT] key.

The following window will appear



4. Choose **NEW** then press [ENT] key.

The following window appears.



5. If you do not need to change anything, choose "SAVE" to finish.

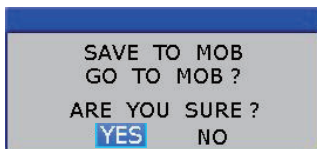
## 4.2 Entering the MOB Mark

Only one MOB mark may be entered.

Each time the MOB mark is entered, the previous MOB mark and its position data are over-written.

1. Long press the **[MOB]** key on any display mode.

The following display appears.

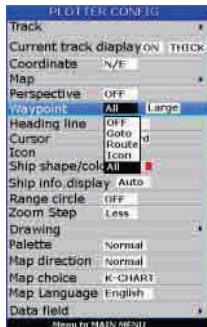


2. To set MOB position as destination, press **[▶]** to choose "YES" and then press **[ENT]** key. Choosing "NO" saves the position as a waypoint called "MOB".

## 4.3 Displaying Waypoint Name

You may display waypoint name as follows:

1. Press the **[MENU]** key on the **PLOTTER** screen.
2. Choose **Waypoint** and then press the **[ENT]** key. The following window will appear.



3. Choose "**All**", "**Goto**", "**Route**", "**Icon**" or "**OFF**" as desired and then press the **[ENT]** key.

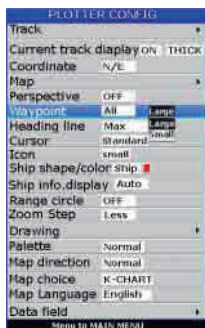
**All:** Displays all waypoint names.

**Goto:** Displays only the GOTO waypoint name.

**Route:** Displays all waypoint names when a route is set as destination.

**OFF:** Do not display any waypoint name.

4. User can change the size of Waypoint Marks

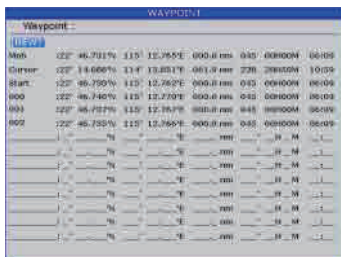


#### 4.4 Operation on the Waypoint Editing

Waypoint position, waypoint name, mark shape, mark color and comment can be edited from the Waypoint Edit.

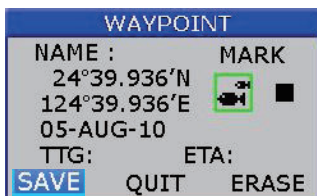
1. Press the [MENU] key twice to enter main menu.
2. Choose Edit and then press [▶] key to select.
3. Choose Waypoint and then press the [ENT] key.

The following window will appear.



4. Choose waypoint to edit and then press the [ENT] key.

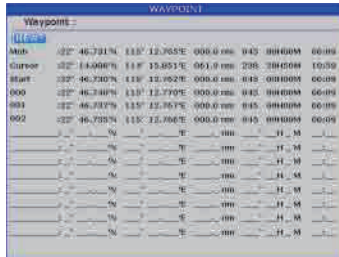
The following window will appear.



5. Choose the object you want to edit and then press the [ENT] key to select.
6. Change name, position, mark shape, mark color, comment as desired.
7. Choose "SAVE" and then press [ENT] key to finish.

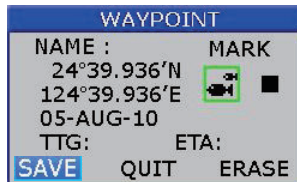
## 4.5 Erasing Waypoints

1. Press the [MENU] key twice to main menu.
2. Choose **Edit** and then press [►] key to select.
3. Choose **Waypoint** and then press the [ENT] key. The following window will appear.



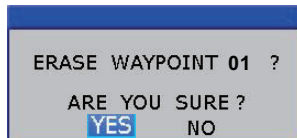
Name	Lat	Long	Time	Date
000	22° 46.731'N	113° 12.765'E	000.0 min	04/08/08
001	22° 46.731'N	113° 12.765'E	001.0 min	04/08/08
002	22° 46.731'N	113° 12.765'E	002.0 min	04/08/08
003	22° 46.731'N	113° 12.765'E	003.0 min	04/08/08
004	22° 46.731'N	113° 12.765'E	004.0 min	04/08/08
005	22° 46.731'N	113° 12.765'E	005.0 min	04/08/08
006	22° 46.731'N	113° 12.765'E	006.0 min	04/08/08
007	22° 46.731'N	113° 12.765'E	007.0 min	04/08/08
008	22° 46.731'N	113° 12.765'E	008.0 min	04/08/08
009	22° 46.731'N	113° 12.765'E	009.0 min	04/08/08
010	22° 46.731'N	113° 12.765'E	010.0 min	04/08/08

4. Select a waypoint and press [ENT] key.
5. The confirm window will appear. Choose "ERASE" and then press [ENT] key.



WAYPOINT	
NAME :	MARK
24°39.936'N	<input checked="" type="checkbox"/>
124°39.936'E	<input checked="" type="checkbox"/>
05-AUG-10	
TTG:	ETA:
SAVE	QUIT ERASE

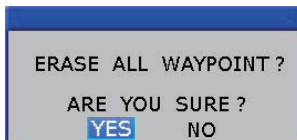
6. Choose "YES" and then press [ENT] key to finish.



ERASE WAYPOINT 01 ?	
ARE YOU SURE ?	
YES	NO

### Erase All Waypoints

1. Press the [MENU] key twice to enter main menu.
2. Choose **Erase** and then press [►] key to select.
3. Choose **All waypoint/MOB** and then press [ENT] key.  
The confirming window will appear.



ERASE ALL WAYPOINT ?	
ARE YOU SURE ?	
YES	NO

4. Choose "YES" and then press [ENT] key to erase all waypoints.

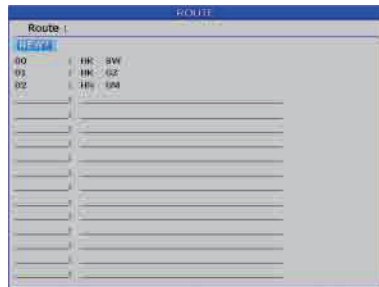


## 5. ROUTES

### 5.1 Creating Routes

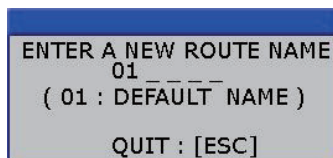
1. Press [MENU] key twice to enter main menu.
2. Choose **Edit** and then press [►] key to select.
3. Choose **Route** and then press [ENT] key.

The following window will appear.

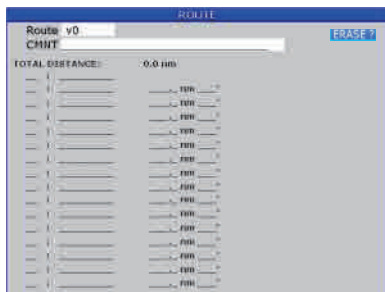


4. Choose "NEW" and then press [ENT] key.

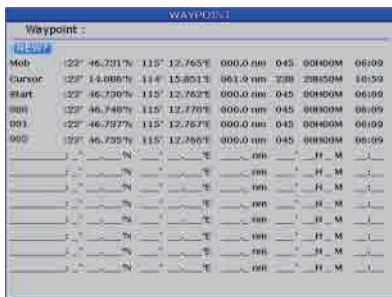
The following window will appear.



5. Use [▲] or [▼] to enter the route name and then press [ENT] key to finish.  
The following will appear.



6. Choose the location (e.g. 01) and then press [ENT] key.  
A new window will open which will let you choose a waypoint.

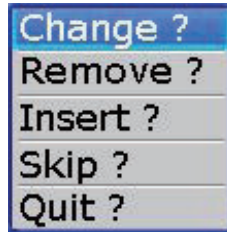


7. Choose the waypoint name that you want to include in the route and then press [ENT] key (e.g., 001). You can also create a new waypoint if needed.  
8. Repeat step 6 and 7 until the route is complete.

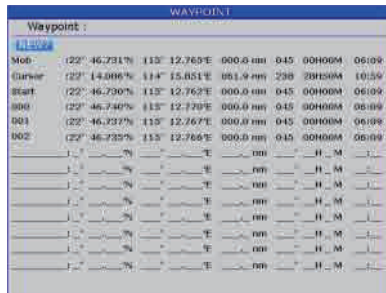
## 5.2 Editing Routes

### Replacing waypoints in a route

1. Press the [MENU] key twice to enter main menu.
2. Choose **Edit** and then press [►] key to select.
3. Choose **Route** and then press [ENT] key to select.
4. Choose the route to edit and then press [ENT] key.
5. Place the cursor on the waypoint to replace, press the [ENT] key to show the route options.



6. Choose "Change" and then press [ENT] key.  
The waypoint select window will appear.

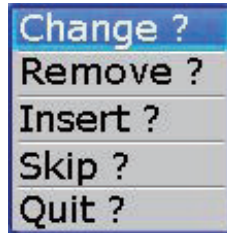


WAYPOINT							
Waypoint :							
1-50							
Mod	(22° 46.731'N	113° 12.763'E	000.0 km	045	00H00M	06:09	
Current	(22° 14.006'N	114° 15.051'E	001.9 nm	230	20H30M	10:59	
Start	(22° 46.730'N	113° 12.762'E	000.0 km	045	00H00M	06:09	
000	(22° 46.744'N	113° 12.770'E	000.0 nm	045	00H00M	06:09	
001	(22° 46.737'N	113° 12.767'E	000.0 nm	045	00H00M	06:09	
002	(22° 46.733'N	113° 12.768'E	000.0 nm	045	00H00M	06:09	
	1	%	E	nm	H	M	
	1	%	E	nm	H	M	
	1	%	E	nm	H	M	
	1	%	E	nm	H	M	
	1	%	E	nm	H	M	
	1	%	E	nm	H	M	
	1	%	E	nm	H	M	
	1	%	E	nm	H	M	
	1	%	E	nm	H	M	

7. Choose the waypoint name that you want to include in the route and then press [ENT] key.
8. Repeat step 5 to 8 until finish edit.

### Permanently deleting a waypoint from a route

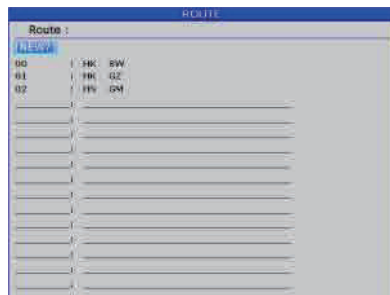
1. Press the [MENU] key twice to enter main menu.
2. Choose **Edit** and then press the [►] key to select.
3. Choose **Route** and then press [ENT] key to select.
4. Choose the route desired and then press [ENT] key to select.
5. Choose the waypoint you want to delete and then press [ENT] key to show the route edit options.



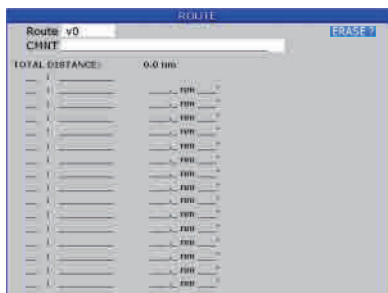
6. Choose "Remove" and then press [ENT] key to finish.

### 5.3 Erasing Routes

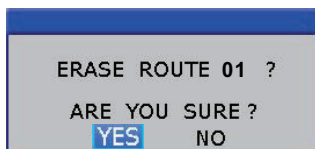
1. Press the [MENU] key twice to enter main menu.
2. Choose **Edit** and then press [►] key to select.
3. Choose **Route** and then press the [ENT] key. The following window will appear.



4. Select a route then press [ENT] key.
5. The confirm window will appear. Choose "ERASE" and then press [ENT] key.



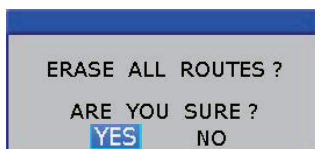
6. Choose "YES" and then press [ENT] key to finish.



### Erase All Routes

1. Press the [MENU] key twice to enter main menu.
2. Choose **Erase** and then press [▶] key to select.
3. Choose **All routes** and then press [ENT] key.

The confirming window will appear.

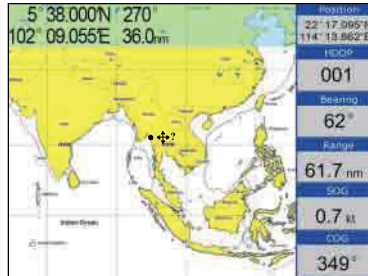


4. Choose "YES" and then press [ENT] key to erase all routes.

## 6. DESTINATION

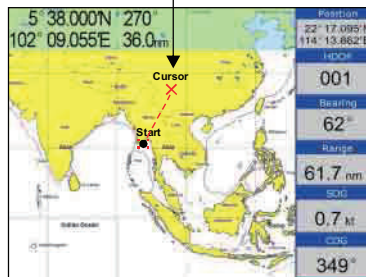
### 6.1 Setting Destination by Cursor

1. Press [F] key to display the **FUNCTION** window.
2. Choose **Goto cursor** and then press [ENT] key to select.
3. The cursor appears with "?".



4. Use the cursor pad to place the cursor on the location desired for destination.
5. Press the [ENT] key to mark destination.

CURSOR set as destination



Bearing from  
Destination

Range from  
Destination

## 6.2 Setting Destination by Waypoint (WPT)

1. Press the [F] key to display the **FUNCTION** window.



2. Choose **Goto WPT** and then press [ENT] key to select.
3. The **WAYPOINT** list appears.

A screenshot of the 'WAYPOINT' list. The list is titled 'Waypoint:' and contains several entries. Each entry has a label (e.g., 'Mob.', 'Cursor', 'Start', '000', '001', '002') followed by coordinates (latitude and longitude) and a distance in nautical miles (nm). The 'Cursor' entry is highlighted.

Waypoint	Lat	Long	Dist (nm)
Mob.	22° 46.731'N	115° 12.765'E	000.0 nm
Cursor	22° 46.731'N	115° 12.765'E	000.0 nm
Start	22° 46.730'N	115° 12.762'E	000.0 nm
000	22° 46.740'N	115° 12.770'E	000.0 nm
001	22° 46.727'N	115° 12.767'E	000.0 nm
002	22° 46.735'N	115° 12.766'E	000.0 nm

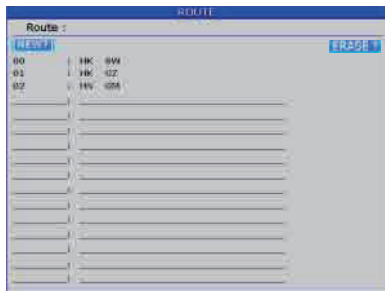
4. Choose a waypoint and then press [ENT] key to finish.

## 6.3 Setting Route as Destination

1. Press the [F] key to display the **FUNCTION** window.
2. Select **Goto route** and then press [ENT] key to select.



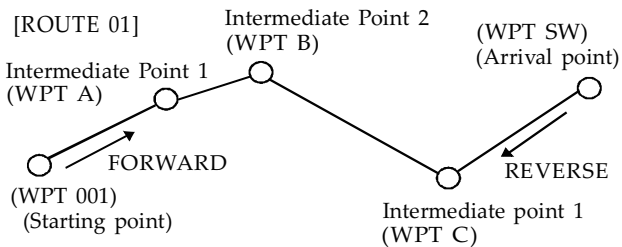
3. The **ROUTE** list appears.



4. Choose a route and then press [ENT] key. The following window appears.



5. Choose "Forward" or "Reverse" in order to traverse the waypoints in the route, and then press [ENT] key to finish.



**Meaning of forward and reverse**



### 6.4 Setting Track Data as Destination

Track Data can be used for navigation.

- 1. Press the [F] key to display the **FUNCTION** window.
- 2. Choose **Goto track** and then press the [ENT] key to select.



- 3. The **SAVED TRACK** window will appear.



- 4. Choose the track that you want to set as destination, and then press [ENT] key.



- 5. Choose Forward or Reverse to start Goto track navigation.

Once a Goto track has been activated, the track will divide it into segments. Up to 200 temporary waypoints are created (named T1,T2, T3, etc. and END) to mark the most significant features of the track, duplicating your exact path as closely as possible. To get the most out of the Goto track feature, remember the following tips:

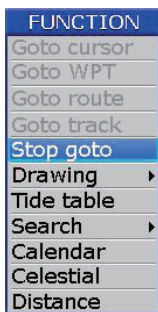
- Always clear the track log at the point that you want to go back to.
- There must be at least two track log points stored in memory to create a track route.
- If the receiver is turned off or satellite coverage is lost during your trip, it will draw a straight line between any point where coverage was lost and where it resumed.
- If your track's changes in distance and direction are too complex, 200 waypoints may not mark your path accurately.

The receiver then assigns the 200 waypoints to the most significant points of your track, and simplifies segments with fewer changes in direction.

## 6.5 Canceling Destination

You can cancel a destination as follows.

1. Press the [F] key to display the FUNCTION window.

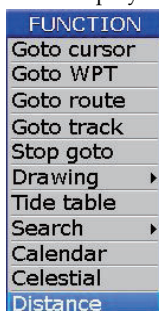


2. Choose Stop goto and press [ENT] key to finish.

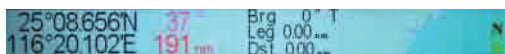
## 6.6 Distance

Measure the distance of several points and save it as a route.

1. Press [F] key in **PLOTTER** screen to display **FUNCTION** window.

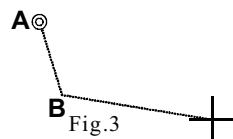


2. Select "**Distance**" and press [ENT] key to activate the distance measurement function.



**Note:**

- LON/LAT is the position of the cursor (point C)
- BRG is the bearing of cursor to the last point (point B)
- LEG is the distance of cursor to the last point (point B)
- DST is the total distance from the cursor to the starting point (AB + BC)
- M is Magnetic North, T is True North



3. Move the cursor to the starting point (A) and press [ENT] to set up starting point. Now all BRG, LEG and DST are display 0.

4. Move the cursor to the next point (B). Now the BRG and LEG display the Bearing and Distance from point A to point B, DST=0.



5. Press [ENT] key, now DST= distance from point A to point B is shown, while BRG and LEG turns to 0.

6. Move the cursor to the next point (C). Now the BRG and LEG displays the Bearing and Distance from point B to point C. DIST displays the total distance from point A to point B.



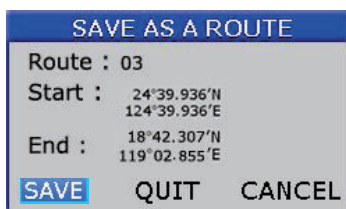
24°06.049'N 114°35.754'E 116.1nm  
BrG 269.1° Leg 96.4nm Dst 61.4nm

7. Press [ENT] key, now DIST = distance of point AB + distance of point BC is shown, while BRG and LEG turns to 0.



24°06.049'N 114°35.754'E 111.1nm  
BrG 0.0° Leg 0.0nm Dst 158.1nm

8. Repeat steps 3, 4 and 5 to measure the distance of several points.  
9. Press [ESC] key during the step 3, 4 or 5, the following menu will pop out.



**SAVE AS A ROUTE**

Route : 03

Start : 24°39.936'N  
124°39.936'E

End : 18°42.307'N  
119°02.855'E

**SAVE** QUIT CANCEL

10. You can select :

- A) "SAVE" to save the measurement as a route.
- B) "QUIT" to quit the distance measurement function without saving.
- C) "CANCEL" to continue the distance measurement.

## 7. ALARM

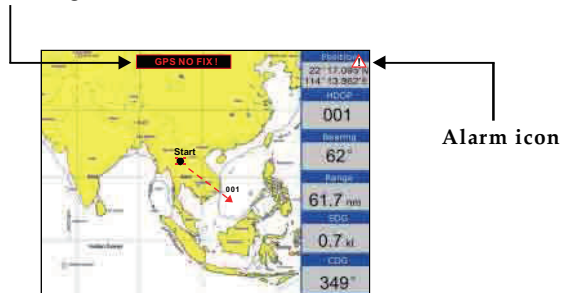
There are six alarm conditions which generates both audio and visual alarms:

**Arrival alarm, Anchor drag alarm, XTE (Cross-Track Error) alarm, Speed alarm, Voltage alarm and Timer alarm.**

When the alarm setting is violated, the buzzer sounds and the name of the offending alarm and the alarm icon appears on the display.

You can silence the buzzer and remove the alarm name indication by pressing any key. The alarm icon remains on the screen until the reason for the alarm is cleared.

Alarm message



### 7.1 Anchor Drag Alarm

Anchor Drag Alarm informs you that own ship is moving when it should be at rest and when the ship moves out a certain set range.

1. Press [MENU] key twice to enter main menu.
2. Choose **Alarm** and then press [►] key to display **ALARM** menu.

ALARM			
Anchor	OFF	00.00	nm
Arrival	OFF	00.00	nm
XTE	OFF	00.00	nm
Speed	OFF	00.0	kt
Voltage	OFF	00.0	V
Timer	OFF	000	min
Buzzer	short		
Warning message			

3. Choose Anchor and then press [ENT] key. The alarm options appear.

ALARM		
Anchor	OFF	00.00 nm
Arrival	OFF	00.00 nm
XTE	ON	00.00 nm
Speed	OFF	00.0 kt
Voltage	OFF	00.0 V
Timer	OFF	000 min
Buzzer	Short	
Warning message		

4. Press [▶] key to select the alarm value and then press [ENT] key to setup the value.
5. Choose "ON" and then press [ENT] key to enable the alarm.

## 7.2 Arrival Alarm

Arrival Alarm informs you that own ship is approaching your set destination.

1. Press [MENU] key to enter main menu.
2. Choose **Alarm** and then press [▶] key to display **ALARM** menu.
3. Choose **Arrival** and then press [ENT] key. The alarm options appear.

ALARM		
Anchor	OFF	00.00 nm
Arrival	OFF	00.00 nm
XTE	OFF	00.00 nm
Speed	ON	00.0 kt
Voltage	OFF	00.0 V
Timer	OFF	000 min
Buzzer	Short	
Warning message		

4. Press [▶] key to select the alarm value and then press [ENT] key to setup the value.
5. Choose "ON" and then press [ENT] key to enable the alarm.

### 7.3 XTE (Cross-Track Error) Alarm

XTE (Cross-Track Error) Alarm warns you when own ship is off its intended course.

1. Press [MENU] key twice to enter main menu.
2. Choose **Alarm** and then press [►] key to display **ALARM** menu.
3. Choose **XTE** and then press [ENT] key. The alarm options appear.

ALARM		
Anchor	OFF	00.00 nm
Arrival	OFF	00.00 nm
XTE	OFF	00.00 nm
Speed	OFF	00.0 kt
Voltage	ON	00.0 V
Timer	OFF	000 min
Buzzer	Short	
Warning message		

4. Press [►] key to select the alarm value and then press [ENT] key to setup the value.
5. Choose "ON" and then press [ENT] key to enable the alarm.

### 7.4 Speed Alarm

Speed Alarm provides visual and aural alerts when the ship's speed is higher or lower than the alarm range set.

1. Press [MENU] key twice to enter main menu.
2. Choose **Alarm** and then press [►] key to display **ALARM** menu.
3. Choose **Speed** and then press [ENT] key. The alarm options appear.

ALARM		
Anchor	OFF	00.00 nm
Arrival	OFF	00.00 nm
XTE	OFF	00.00 nm
Speed	OFF	00.0 kt
Voltage	OFF	00.0 V
Timer	High Low	000 min
Buzzer	Short	
Warning message		

4. Press [►] key to select the alarm value and then press [ENT] key to setup the value.
5. Choose "ON" and then press [ENT] key to enable the alarm.

## 7.5 Voltage Alarm

Voltage Alarm warns you when the input voltage in the unit is higher than the set value.

1. Press [MENU] key to enter main menu.
2. Choose Alarm and then press [▶] key to display ALARM menu.
3. Choose Voltage and then press [ENT] key. The alarm options appear.

ALARM		
Anchor	OFF	00.00 nm
Arrival	OFF	00.00 nm
XTE	OFF	00.00 nm
Speed	OFF	00.0 kt
Voltage	OFF	00.0 V
Timer	OFF	000 min
Buzzer	ON	
Warning message		

4. Press [▶] key to select the alarm value and then press [ENT] key to setup the value.
5. Choose "ON" and then press [ENT] key to enable the alarm.

## 7.6 Timer Alarm

Timer Alarm provides audio and visual alarms when the time set has expired.

1. Press [MENU] key to enter main menu.
2. Choose **Alarm** and then press [▶] key to display **ALARM** menu.
3. Choose **Timer** and then press [ENT] key. The alarm options appear.

ALARM		
Anchor	OFF	00.00 nm
Arrival	OFF	00.00 nm
XTE	OFF	00.00 nm
Speed	OFF	00.0 kt
Voltage	OFF	00.0 V
Timer	OFF	000 min
Buzzer	OFF	
	ON	
Warning message		

4. Press [▶] key to select the alarm value and then press [ENT] key to setup the value.
5. Choose "ON" and then press [ENT] key to enable the alarm.



## 7.7 Buzzer Type Selection

The buzzer sounds whenever an alarm setting is violated.

1. Press the [MENU] key twice to enter main menu.
2. Choose **Alarm** and then press [►] key to select.
3. Choose **Buzzer** and then press [►] key to select.
4. Choose buzzer type desired and then press [ENT] key to finish.

ALARM			
Anchor	OFF	00.00	nm
Arrival	OFF	00.00	nm
XTE	OFF	00.00	nm
Speed	OFF	00.0	kt
Voltage	OFF	00.0	V
Timer	OFF	000	min
Buzzer	Short		
Warning	Short		
	Long		
	Constant		

Short: Two short beeps

Long: Three long beeps

Constant: Continuous beeps

### Disabling the alarm

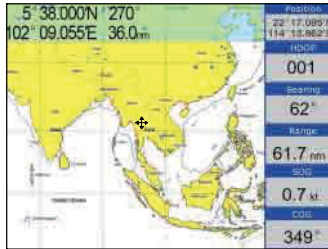
1. Press any key to disable the buzzer of any alarm.
2. The Alarm Icon will not disappear until the reason for the alarm is cleared.

## 8. DRAWING

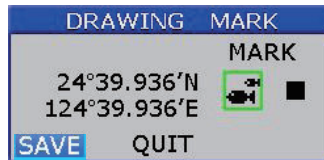
### 8.1 Drawing Marks

1. Press [F] key to display the **FUNCTION** window.
2. Choose Drawing and then press [►] key to select.
3. Choose **Mark** and then press [ENT] key.

The cursor appears with "+?" on the PLOTTER screen.



4. Use the cursor pad to place the cursor on the location desired, add a mark and then press [ENT] key. The following window appears.



5. Edit Lat/Lon or mark, and then choose "SAVE" to finish.

#### Changing the Symbol and Color

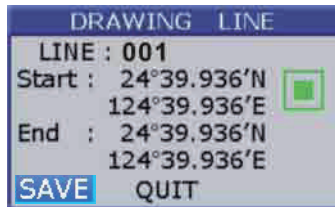
1. Move the cursor to the mark and press [ENT] key to select.
2. Use [▲] or [▼] to select color or symbol then press [ENT] key.
3. Select "SAVE" to finish.

## 8.2 Drawing Lines

1. Press [F] key to display the **FUNCTION** window.
2. Choose Drawing and then press [►] key to select.
3. Choose Line and then press [ENT] key.

The cursor appears with "+" on the **PLOTTER** screen.

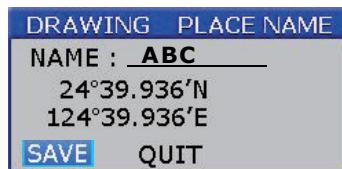
4. Use the cursor pad to place the cursor on the location desired, add a point of the line and then press [ENT] key.
5. Repeat step 4 to complete the line.
6. Press [ESC] key to finish, and then the save confirmation window will appear.



7. Move the cursor to the color and press [ENT] key to modify the color, if required.
8. Choose "SAVE" and then press [ENT] key to save the line.

## 8.3 Drawing Place name

1. Press [F] key to display the **FUNCTION** window.
2. Choose **Drawing** and then press [►] key to select.
3. Choose **Place name** and then press [ENT] key.
4. The cursor appears with a "+" on the **PLOTTER** screen.
5. Use the cursor pad to place the cursor on the location desired, add a name and then press [ENT] key. The save confirmation window will appear.

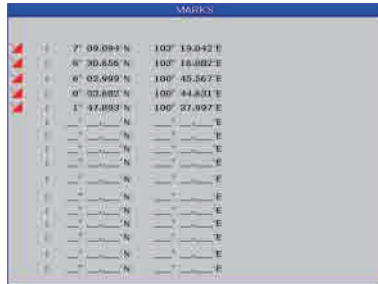


6. Enter the name and then choose "SAVE" to finish.

## 8.4 Editing Drawing Marks

1. Press [MENU] key twice to enter main menu.
2. Choose **Edit** and then press [►] key to select.
3. Choose **Drawing marks** and then press [ENT] key.

The following window appears.

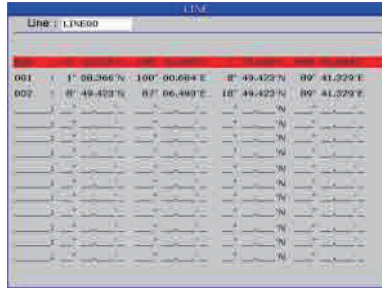


4. Select a mark then press [ENT] key to edit.
5. After editing, choose "SAVE" and then press [ENT] key to finish.

## 8.5 Editing Drawing Lines

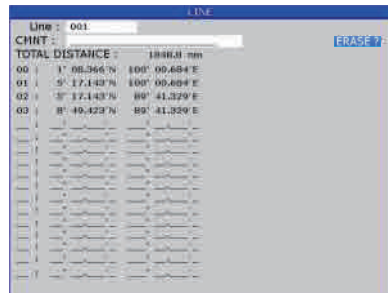
1. Press [MENU] key twice to enter main menu.
2. Choose Edit and then press [►] key to select.
3. Choose Drawing lines and then press [ENT] key.

The following window appears.



4. Choose the line that you want to edit and then press [ENT] key.

The following window appears.



5. Choose the point that you want to edit and then press [ENT] key.
6. After editing, choose "SAVE" and then press [ENT] key to finish.

## 8.6 Editing Drawing Place Name

1. Press **[MENU]** key twice to enter main menu.
2. Choose Edit and then press **[▶]** key to select.
3. Choose Drawing placename and then press **[ENT]** key.

The following window appears.

[illegible]

4. Choose the place name that you want to edit and then press [ENT] key.

The following window appears.

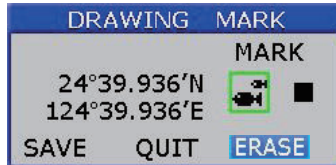
DRAWING	PLACE NAME
NAME : ABC	
24°39.936'N	
124°39.936'E	
SAVE	QUIT

5. After editing, choose "SAVE" and then press [ENT] key to finish.

## 8.7 Erasing Drawing Marks

1. Press [MENU] key twice to enter main menu.
2. Choose **Edit** and then press [►] key to select.
3. Choose **Drawing marks** and then press [ENT] Key.
4. Choose the mark that you want to clear, and then press [ENT] key.

The confirmation window will appears.

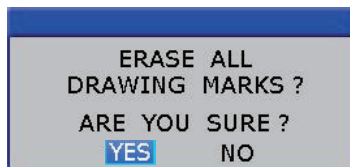


5. Choose "ERASE" and then press [ENT] key.
6. The confirmation window will appear then choose "YES" to finish.

### Erasing All Drawing Marks

1. Press [MENU] key twice to enter main menu.
2. Choose **Erase** and then press [►] key to select.
3. Choose All drawing marks and then press [ENT] key.

The confirmation window will appears.



4. Choose "YES" to erase all drawing marks.

## 8.8 Erasing Drawing Lines

1. Press [MENU] key twice to enter main menu.
2. Choose **Edit** and then press [►] key to select.
3. Choose **Drawing lines** and then press [ENT] key to select.
4. Choose the line that you want to erase, and then press [ENT] key.

The confirmation window appears.

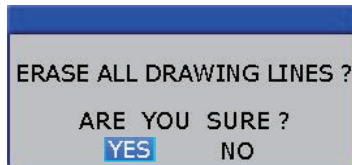


5. Choose "ERASE" and then press [ENT] key to select.
6. The confirmation window will appear then choose "YES" to finish.

### Erasing All Drawing Line

1. Press [MENU] key twice to enter main menu.
2. Choose **Erase** and then press [►] key to select.
3. Choose All drawing lines and then press [ENT] key.

The confirmation window will appear.

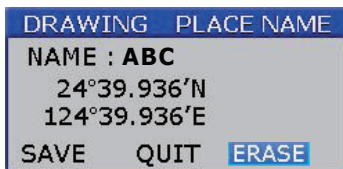


4. Choose "YES" to erase all drawing lines.



## 8.9 Erasing Drawing Place Name

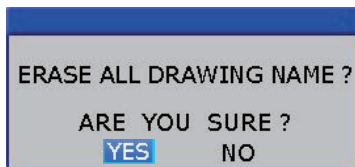
1. Press [MENU] key twice to enter main menu.
2. Choose **Edit** and then press [►] key to select.
3. Choose **Drawing placename** and then press [ENT] key to select.
4. Choose the place name that you want to erase, and then press [ENT] key.  
The confirmation window appears.



5. Choose "ERASE" and then press [ENT] key.
6. The confirmation window will appear then choose "YES" to finish.

### Erasing All Drawing Place Name

1. Press [MENU] key twice to main menu.
2. Choose **Erase** and then press [►] key to select.
3. Choose **All drawing name** and then press [ENT] key.  
The confirmation window will appears.



4. Choose "YES" to erase all place names.

## 9. OTHER SETTING

### 9.1 Map Scale

You can change the map scale display format.

1. Press [MENU] key twice to enter main menu.
2. Choose **Setup** and then press [▶] key to select.

SETUP			
Map scale	Miles	Simulation	
Speed unit	nm,kt	Calibrate	
Depth unit	meter	Map source	SD Card
Wind unit	kt	Languages	English
BRG. REF	True	key beep	ON
MAG. VAR.	Auto	Wind screen	OFF
Deviation Lat	+00.000	Ais screen	OFF
Deviation Lon	+00.000	Sonar sereen	ON
Time	24H +00:00	NMEA data dispaly	
TTG/ETA speed	Auto		

3. Choose Map scale and then press [ENT] key to select.
4. Choose "Miles" or "Ratio" as desired and then press [ENT] key to finish.

### 9.2 Unit of Measurement

#### Speed Unit

Distance/speed can be displayed in nautical miles/knots, kilometers/kilometers per hour, or statute miles/kilometers per hour.

1. Press [MENU] key twice to enter main menu.
2. Choose **Setup** and then press [▶] key to select.
3. Choose **Speed unit** and then press [ENT] key to select.

SETUP			
Map scale	Nm	Simulation	
Speed unit	nm, kt	Calibrate	
Depth unit	nm, kt	Map source	SD Card
Wind unit	km, kmh sm, kph	Languages	English
BRG. REF	True	key beep	ON
MAG. VAR.	Auto	Wind screen	OFF
Deviation Lat	+00.000	Ais screen	OFF
Deviation Lon	+00.000	Sonar sereen	ON
Time	24H +00:00	NMEA data dispaly	
TTG/ETA speed	Auto		

4. Choose "nm, kt", "km, kmh" or "sm, kph" as desired and then press [ENT] key to finish.

## Depth Unit

1. Press [MENU] key twice to enter main menu.
2. Choose **Setup** and then press [►] key to select.
3. Choose **Depth unit** and then press [ENT] key to select.

SETUP			
Map scale	Nm	Simulation	
Speed unit	nm,kt	Calibrate	
Depth unit	feet	Map source	SD Card
Wind unit	feet	Languages	English
BRG. REF.	fathom meter	key beep	ON
MAG. VAR.	Auto	Wind screen	OFF
Deviation Lat	+00.000	Ais screen	OFF
Deviation Lon	+00.000	Sonar sereen	ON
Time	24H +00:00	NMEA data dispaly	
TTG/ETA speed	Auto		

4. Choose "feet", "fathom" or "meter" as desired and then press [ENT] key to finish.

## 9.3 Bearing Reference

Ship's course and bearing to a waypoint may be displayed in true or magnetic bearing. Magnetic bearing is true bearing plus (or minus) earth's magnetic deviation. Use the bearing reference in accordance with the compass interfaced: magnetic for magnetic compass, true for gyrocompass.

1. Press [MENU] key twice to enter main menu.
2. Choose **Setup** and then press [►] key to select.
3. Choose BRG. REF. and then press [ENT] key to select.

SETUP			
Map scale	Nm	Simulation	
Speed unit	nm,kt	Calibrate	
Depth unit	meter	Map source	SD Card
Wind unit	kt	Languages	English
BRG. REF.	True	key beep	ON
MAG. VAR.	True Magnetic	Wind screen	OFF
Deviation Lat	+00.000	Ais screen	OFF
Deviation Lon	+00.000	Sonar sereen	ON
Time	24H +00:00	NMEA data dispaly	
TTG/ETA speed	Auto		

4. Choose "True" or "Magnetic" as desired and then press [ENT] key to finish.

## 9.4 Magnetic Variation

The location of the magnetic North Pole is different from the geographical North Pole. This causes a difference between the true and magnetic north direction. This difference is called magnetic variation, and varies with respect to the observation point on earth.

Your unit is pre-programmed with all the earth's magnetic variation. However, you may want to enter variation manually to refine accuracy. Set **BRG. REF** on the **PLOTTER** screen to "Magnetic" to use magnetic variation.

1. Press **[MENU]** key twice to enter main menu.
2. Choose **Setup** and then press **[▶]** key to select.
3. Choose **MAG. VAR.** and then press **[ENT]** key to select.

SETUP			
Map scale	Nm	Simulation	
Speed unit	nm,kt	Calibrate	
Depth unit	meter	Map source	SD Card
Wind unit	kt	Languages	English
BRG. REF	True	key beep	ON
MAG. VAR.	Auto	Wind screen	OFF
Deviation Lat	Auto	Ais screen	OFF
Deviation Lon	Manual	Sonar screen	ON
Time	24H +00:00	NMEA data display	
TTG/ETA speed	Auto		

4. Choose "Auto" or "Manual" (if you choose "Manual", you need to input the value manually) as desired and then press **[ENT]** key to finish.

## 9.5 Deviation

You can input the deviation of the ship or map manually to correct the position error from GPS error or map error.

1. Press [MENU] key twice to enter main menu.
2. Choose **Setup** and then press [►] key to select.
3. Choose **Deviation** and then press [ENT] key to select.

SETUP			
Map scale	Nm	Simulation	
Speed unit	nm,kt	Calibrate	
Depth unit	meter	Map source	SD Card
Wind unit	kt	Languages	English
BRG. REF	True	key beep	ON
MAG. VAR.	Auto	Wind screen	OFF
Deviation Lat	+00.000	Ais screen	OFF
Deviation Lon	+00.000	Sonar screen	ON
Time	24H +00:00	NMEA data display	
TTG/ETA speed	Auto		

4. Input the value as desired and then press [ENT] to finish. To disable deviation, input "0" into the value.

## 9.6 Time

GPS uses UTC time. If you would rather use local time, enter the Time difference (range: -13:30 to +13:30) between it and UTC time.

You may display the time in 12 or 24 hour format.

1. Press [MENU] key twice to enter main menu.
2. Choose **Setup** and then press [►] key to select.
3. Choose **Time** and then press [►] key to select.

SETUP			
Map scale	Nm	Simulation	
Speed unit	nm,kt	Calibrate	
Depth unit	meter	Map source	SD Card
Wind unit	kt	Languages	English
BRG. REF	True	key beep	ON
MAG. VAR.	Auto	Wind screen	OFF
Deviation Lat	+00.000	Ais screen	OFF
Deviation Lon	+00.000	Sonar screen	ON
Time	24H +07	NMEA data display	
TTG/ETA speed	24H		
	12H		

4. Input the time difference as desired. Choose "24H" or "12H" as desired and then press [ENT] key to finish.

## 9.7 TTG/ETA speed

To calculate time-to-go and estimated time of arrival, enter your speed as below.

1. Press the [MENU] key twice to enter main menu.
2. Choose **Setup** and then press [▶] key to select.
3. Choose **TTG/ETA speed** and then press [ENT] key select.

SETUP			
Map scale	Nm	Simulation	
Speed unit	nm,kt	Calibrate	
Depth unit	meter	Map source	SD Card
Wind unit	kt	Languages	English
BRG. REF	True	key beep	ON
MAG. VAR.	Auto	Wind screen	OFF
Deviation Lat	+00.000	Ais screen	OFF
Deviation Lon	+00.000	Sonar sereen	ON
Time	24H +00:00	NMEA data dispaly	
TTG/ETA speed	Auto		
	Auto		
	Manual		

4. Choose "Auto" for automatic speed input (GPS calculated speed), or "Manual" for manual input.

## 9.8 Key beep

you can set the key sound

1. Press the [MENU] key twice to enter main menu.
2. Choose **Setup** and then press [▶] key to select.
3. Choose **Key beep** and then press [ENT] key select.

SETUP			
Map scale	Nm	Simulation	
Speed unit	nm,kt	Calibrate	
Depth unit	meter	Map source	SD Card
Wind unit	kt	Languages	English
BRG. REF	True	Key beep	OFF
MAG. VAR.	Auto	Wind screen	OFF
Deviation Lat	+00.000	Ais screen	ON
Deviation Lon	+00.000	Sonar sereen	ON
Time	24H +00:00	NMEA data dispaly	
TTG/ETA speed	Auto		

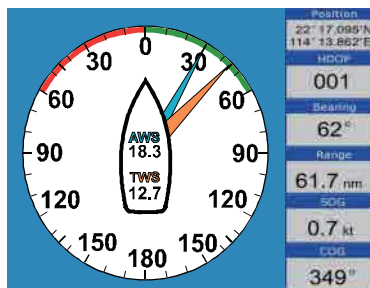
4. Choose "OFF" or "ON" and then press [ENT] key to finish.

## 9.9 Wind screen

1. Press the [MENU] key twice to enter main menu.
2. Choose **Setup** and then press [▶] key to select.
3. Choose **Wind screen** and then press [ENT] key select.

SETUP			
Map scale	Nm	Simulation	
Speed unit	nm,kt	Calibrate	
Depth unit	meter	Map source	SD Card
Wind unit	kt	Languages	English
BRG. REF	True	key beep	ON
MAG. VAR.	Auto	Wind screen	ON
Deviation Lat	+00.000	Ais screen	OFF
Deviation Lon	+00.000	Sonar screen	ON
Time	24H +00:00	NMEA data display	
TTG/ETA speed	Auto		

- Choose **ON** and then press [ENT] key to finish. The following message appears



## 9.10 GPS setting

### 9.10.1 Choosing GPS output data

The unit's default is using an internal GPS module for position fixing. On the other hand, you can use external GPS data for position fixing.

- Press [MENU] key on the **SATELLITE** screen.
- Choose **Output** and then press [ENT] key to select.

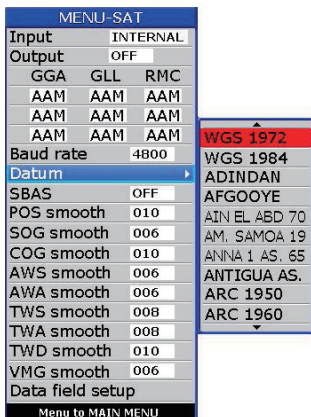
MENU-SAT			
Input	INTERNAL		
Output	OFF		
GGA	G OFF	MC	
AAM	AAM	AAM	
AAM	AAM	AAM	
AAM	AAM	AAM	
Baud rate	4800		
Datum			
SBAS	OFF		
POS smooth	010		
SOG smooth	006		
COG smooth	010		
AWS smooth	006		
AWA smooth	006		
TWS smooth	008		
TWA smooth	008		
TWD smooth	010		
VMG smooth	006		
Data field setup			
Menu to MAIN MENU			

- Choose "ON" or "OFF" as desired and then press [ENT] key.
- Press [►] key to select your desired output data, press [ENT] key to finish.

### 9.10.2 Datum setting

You can choose 6 types of data output at the same time.

1. Press [MENU] on the **SATELLITE** screen.
2. Choose **Datum** and press [ENT] key to select.

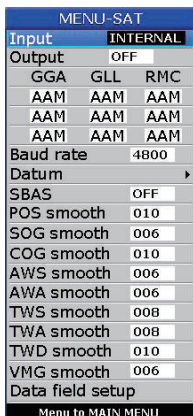


3. Choose your desired datum and press [ENT] key to confirm.

### 9.10.3 Smoothing

You can setup position smoothing, speed smoothing and course smoothing.

1. Press [MENU] key on the **SATELLITE** screen.



2. Choose **POS** smooth to enter position smoothing data.
3. Choose **SOG** smooth to enter speed smoothing data.
4. Choose **COG** smooth to enter course smoothing data.



## 9.11 NMEA data display

1. Press [MENU] key twice to enter main menu.
2. Choose **Setup** and then press [►] key to select.
3. Choose **NMEA data display** and then press [ENT] key.

SETUP			
Map scale	Nm	Simulation	
Speed unit	nm,kt	Calibrate	
Depth unit	meter	Map source	SD Card
Wind unit	kt	Languages	English
BRG. REF	True	key beep	ON
MAG. VAR.	Auto	Wind screen	OFF
Deviation Lat	+00.000	Ais screen	OFF
Deviation Lon	+00.000	Sonar screen	ON
Time	24H +00:00	NMEA data display	
TTG/ETA speed	Auto		

4. NMEA data display is used during the installation to check whether the NMEA input and output data to and from other equipment onboard is normal. Press [↔] key to switch between the input and output ports. Press [ENT] key to stop scrolling of NMEA data and press [ENT] key again to restart NMEA data scrolling. Press [ESC] key to quit the NMEA data display.

NMEA DATA	
\$GPGLL.....N,N°64	
\$GPRMC,V.....N°53	
\$GPVTG.....N°30	
\$GPRGA.....0.00,99.99.....°48	
\$GPRGA,A,1.....99.99,99.99,99.99°30	
\$GPRSV,L,1,01,14...26°79	
\$GPDL.....N,N°64	
\$GPRMC,V.....N°53	
\$GPVTG.....N°30	
\$GPRGA.....0.00,99.99.....°48	
\$GPRGA,A,1.....99.99,99.99,99.99°30	
\$GPRSV,L,1,01,14...26°79	
◆ ENTER TO STOP ◆ ZOOM IN TO CHANGE PORT      PORT: NMEA 1	

## 10. THE AIS FUNCTION

### 10.1 Vessels list

1. Press [MENU] on the AIS screen.

MENU - AIS	
Activation Ring	05.00 nm
CPA Limit	05.00 nm
TCPA Limit	10 min
CPA/TCPA Alarm	OFF
Status	IN port
AIS detail list	
AIS TX	OFF
AIS Vessel	Line
Menu to MAIN MENU	

2. Choose AIS detail list and then press [ENT] key. The AIS SHIP LIST window will appear.

AIS SHIP LIST					
Station	MMSI	Name	Dist	cog	Type
WCC0000000	1000000000000000	GREEN WAVE TRANSPORT	100.0 nm	200°	A
WCC0000000	1000000000000000	GREEN WAVE TRANSPORT	100.0 nm	200°	A
WCC0000000	1000000000000000	GREEN WAVE TRANSPORT	100.0 nm	200°	A

### 10.2 The collision alarm

1. Press [MENU] on the AIS screen.

MENU - AIS	
Activation Ring	05.00 nm
CPA Limit	05.00 nm
TCPA Limit	10 min
CPA/TCPA Alarm	OFF
Status	IN port
AIS detail list	
AIS TX	OFF
AIS Vessel	Line
Menu to MAIN MENU	

2. Select CPA Limit or TCPA Limit then press [ENT] key to enter a value.
3. Select CPA Alarm or TCPA Alarm then press [ENT] key to choose "ON" or "OFF".

### 10.3 Own ship's information

There are two ways to display "Own Ship Info"

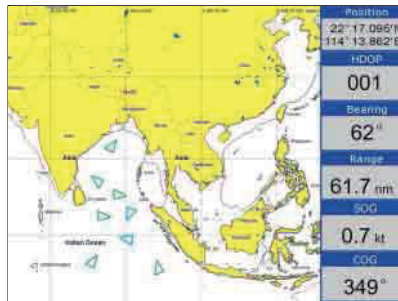
1. Enter the "Vessels list", and press the [MENU] key, and then select the "Own Ship Info" to check all the information of your own ship.
2. Move the cursor to select your AIS Vessel on the chart screen and press the [ENT] key.

OWN SHIP INFORMATION	
NAME : HANGGONGYYOU1003	
MMSI : 123456789	Callsign : BQDF
IMO :	Position sensor : GPS
SOG : 15.3 kt	COG : 312°
Position : 22°35.587'N	110°18.912'E
Ship type : Cargo ship	
Destination : SHANGHAI	
Navigation status : Machine voyage 1	
Draft of ship : 4.5m	Out of view range !
Slew rate :	
Estimated arrival time : 11/05 20:00	
Antenna position: Fr. head 045m	Fr. stern 019m
	Fr. left 005m Fr. right 009m
CPA/tCPA : 3.69nm	min : 11.15s
[ENT] : mark	[ESC] : exit

### 10.4 Chart Screen

Users can check all AIS vessels being received in real-time on the chart screen, as well as the specific position and track of your own ship on the charts.

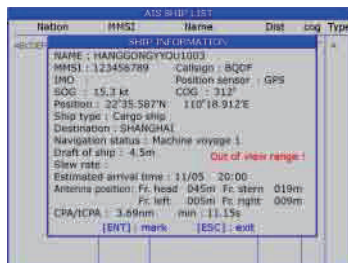
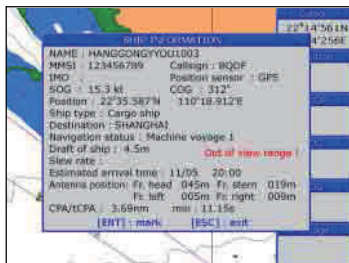
The track length of AIS vessels depends on the equipment memory space, generally not less than 20 track points.



## 10.5 View AIS vessels' information on chart screen

There are two ways to view AIS vessels' information: one is to move the cursor to select AIS vessel on the charts screen, and press the [ENT] key.

The other is to select the AIS vessel from the AIS vessels list, and press the [ENT] key.

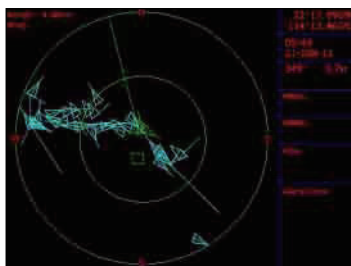


## 10.6 Check all AIS ships within the scope of Radar (AIS screen)

Displays all AIS ships within the current scope of the Radar. The current location of the own ship is at the center of the map, appearing as a white hollow triangle, and the vertex angle of the triangle stands for the current direction of your own ship. The blue hollow triangle stands for the vessels of CLASS B. The green hollow triangle stands for CLASS A vessels. The green hollow square stands for BASE STATION. Circle stands for no direction.

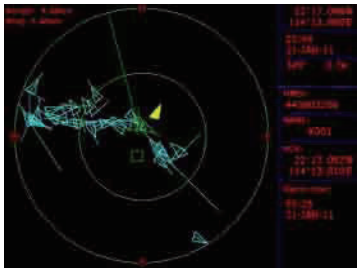
The collision alarm setting and the current scope of radar can be displayed on the upper left corner of the Radar, and the scope can be adjusted by pressing the [X] key and [Y] key.

The message display frame on the upper right corner of the Radar displays the following information: the own ship's position, the current time, the current speed/direction of the own ship.



## 10.7 Emergency alarm

The information of the emergency alarm received is displayed on the bottom right corner. The emergency alarm is always available and can not be deleted, if the emergency alarm information is not read, after exiting the alarm menu, the "emergency alarm" window will pop up a little later. The warning ship displayed on the Radar will be yellow and flashing.

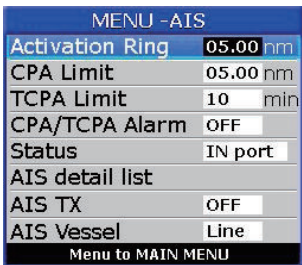


The relevant data (including the time, place, the relevant ship's information, etc.) will also be saved by the display terminals. It can be the basis of analysis in the event of any accident.

## 10.8 Entry/Departure setting

The Entry/Departure setting is for the temporary shut down or restart of the collision alarm. When entering the port, the collision alarm will be temporarily closed. When leaving the port, the collision alarm will be opened.

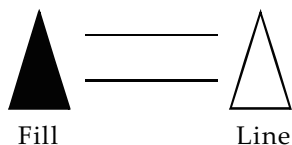
1. Press the [MENU] key at the AIS screen.
2. Choose **Status** then press [ENT] key to select.
3. Select "In Port" or "Out Port" as desired and press [ENT] key to finish.



## 10.9 AIS Vessel

1. User can define the AIS vessel display as either "Fill" or "Line".

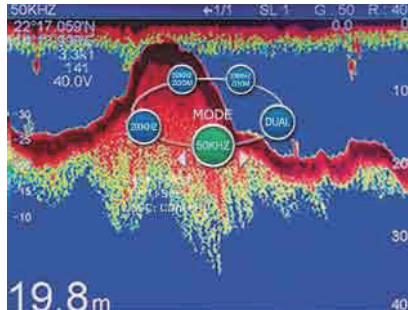
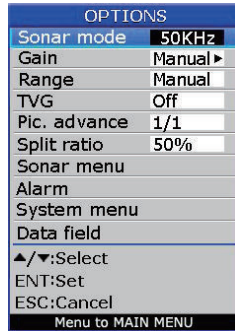
MENU -AIS	
Activation Ring	05.00 nm
CPA Limit	05.00 nm
TCPA Limit	10 min
CPA/TCPA Alarm	OFF
Status	IN port
AIS detail list	
AIS TX	OFF
AIS Vessel	Line
Menu to MAIN ME	
	Line
	Fill



# 11. HD FISHFINDER OVERVIEW

## 11.1 Sonar mode

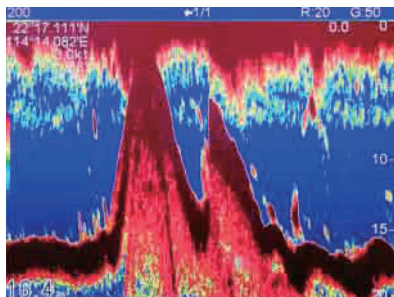
1. Press [MENU] key in **SOUNDER** screen.
2. Choose **Sonar mode** and then press [ENT] key or press and hold [MODE] key in the **SOUNDER** screen. The following window will appear.



MODE	Function
200KHz	Provides the high frequency (200KHz)normal picture on the full screen.
50KHz	Displays the low frequency (50KHz)normal picture on the full screen.
DUAL	Displays the normal display for high frequency (200KHz) on the right half and low frequency (50KHz) on the left half.
200KHz ZOOM	Shows the normal display of the high frequency (200KHz) on the right half and its zoom display on the left half.
50KHz ZOOM	Provides the normal display of the low frequency (50KHz)on the right half and its zoom display on the left half.

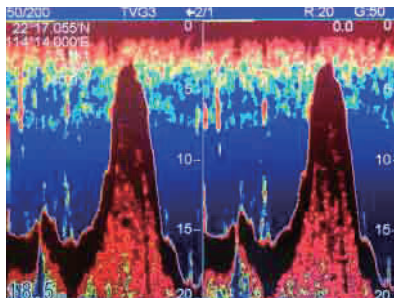
### **200KHz, 50KHz (high frequency, low frequency) mode**

The sounder uses ultrasonic pulses to detect bottom conditions. The lower the frequency of the pulse the wider the detection area. Therefore, the 50KHz frequency is useful for general detection and judging bottom conditions, while the 200KHz frequency is useful for detailed observation of fish schools.



### **DUAL frequency mode**

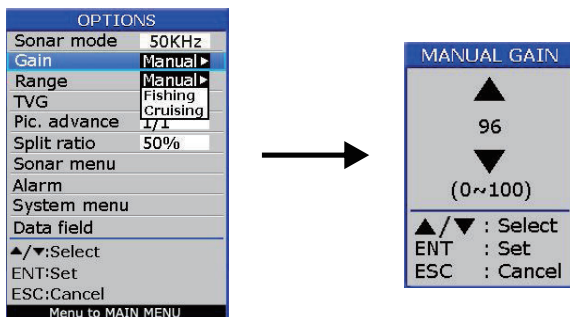
This mode provides the 50KHz picture on the left-half of the screen and the 200KHz on the right half, and is useful for detecting fish schools which have different reflection characteristics with frequency. For example, a school of tiny fish like minnow returns stronger echoes on a high frequency compared to a low frequency.





## 11.2 Gain

1. Press [MENU] key in **SOUNDER** screen.
2. Choose **Gain** and then press [ENT] key, or press [ENT] key in the **SOUNDER** screen to adjust gain manually. The following window will appear.



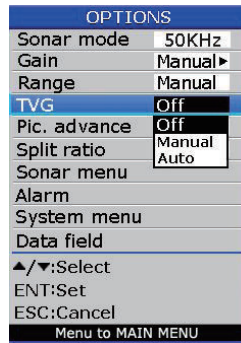
3. Choose Manual, Fishing or Cruising as desired and then press the [ENT] key, or press and hold [ENT] key in SOUNDER screen. **AUTO 1** (fishing) mode is activated which is for ground fishing with automated gain adjustments. Press [ENT] key again to activate the **AUTO 2** (cruising) mode with automatic gain adjustments for cruising. Press and hold [ENT] key to return to manual gain mode.

## 11.3 Range

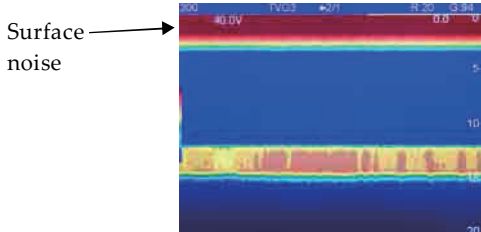
1. Press [MENU] key in **SOUNDER** screen.
2. Choose **Range** and then press [ENT] key to select.
3. Choose "Manual" or "Auto" and then press the [ENT] key or when in the **SOUNDER** screen, press and hold [↖] or [↘] to change to Manual or Auto.
4. If you choose Manual, press the [ESC] key to return to **SOUNDER** screen. Press [↖] or [↘] to increase or decrease in the depth range.

## 11.4 TVG

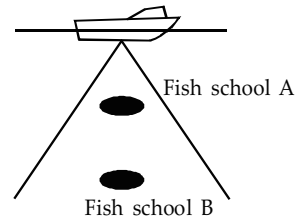
1. Press [MENU] key in **SOUNDER** screen.
2. Choose **TVG** and then press [ENT] key. The following window will appear.



3. Choose "Off" or "Manual" as desired then press [ENT] key.
- The TVG compensates for propagation loss of sound, so that the echoes from the same fish school size are displayed in the same color. Normally, set it between "0" and "5". Avoid excessive TVG; weak echoes may not be displayed. The TVG is also useful for reducing surface noise.



Appearance of  
surface noise



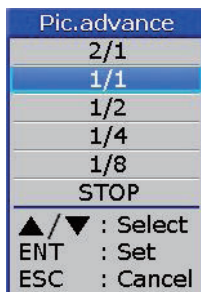
How TVG compensates for  
propagation loss of sound

Note: Surface noise appearing in the range of 0 to 40 m can be reduced by the Clutter function.

## 11.5 Picture advance

The picture advance speed determines how quickly the vertical scan lines run across the screen.

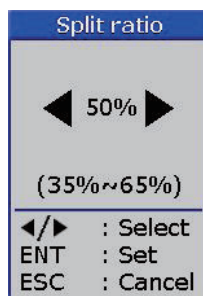
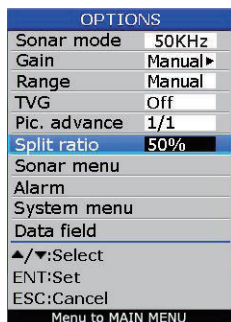
1. Press [MENU] key in **SOUNDER** screen.
2. Choose **Pic. advance** and then press [ENT] key or press and hold [►] key in **SOUNDER** screen. The following window will appear.



3. Press the [▲] or [▼] key to select speed: 2/1(FAST), 1/1, 1/2, 1/4, 1/8 (SLOW) or STOP advance.

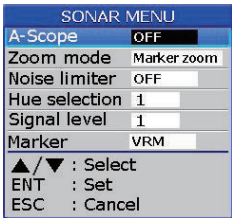
## 11.6 Split ratio

1. When in **PLOTTER+SOUNDER** screen and the **SOUNDER** screen is  $\geq 50\%$ , press [MENU] key.
2. Choose **Split ratio** and then press [ENT] key to setup split ratio, or press and hold [MODE] key in the **PLOTTER+SOUNDER** screen. The following window will appear.



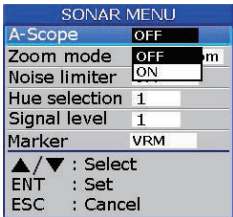
11.7 Sonar Menu

- 1. Press [MENU] key in **SOUNDER** screen.
- 2. Choose **Sonar menu** and then press [ENT] key. The following window will appear.

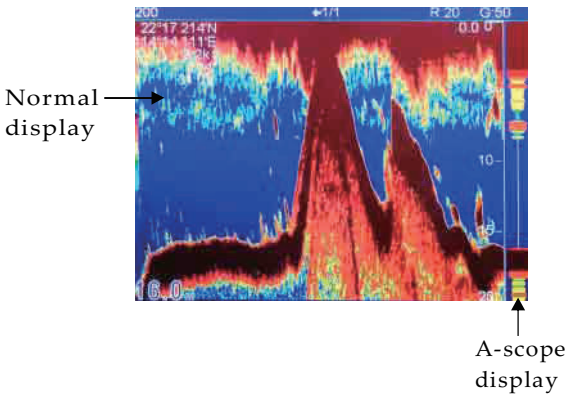


11.7.1 A-Scope

- 1. Press [MENU] key in **SOUNDER** screen.
- 2. Choose **Sonar menu** and then press [ENT] key to select.
- 3. Choose **A-Scope** and then press [ENT] key. The following window will appear.
- 4. Press the [▲] or [▼] key to enable or disable the A-Scope.

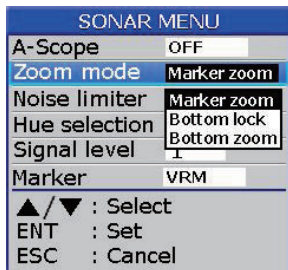


This display shows echoes at each transmission with amplitudes and tone proportional to their intensities, on the right 1/4 of the screen. It is useful for estimating the kind of fish school and bottom composition.



### 11.7.2 Zoom modes

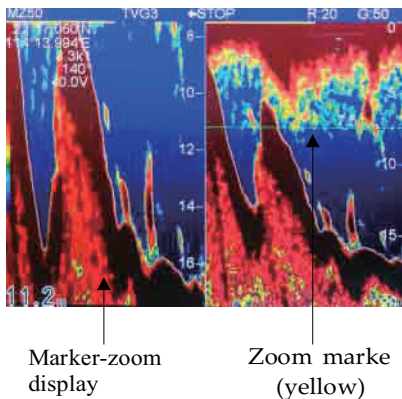
1. Press [MENU] key in **SOUNDER** screen.
2. Choose **Sonar menu** and then press [ENT] key to select.
3. Choose **Zoom mode** and then press [ENT] key. The following window will appear.



4. Choose "Marker Zoom", "Bottom lock" or "Bottom zoom" as desired then press [ENT] key to finish.

#### MARKER ZOOM

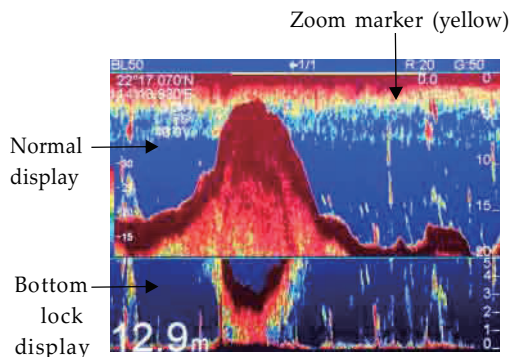
This mode expands selected area of the normal picture to full vertical size of the screen on the left-half window. You may specify the portion to expand with the VRM (Variable Range Marker), which you can shift with [▲] or [▼] key. The area between the VRM and the zoom range marker is expanded. The length of the segment is equal to one division of the depth scale.



## BOTTOM LOCK

This display provides a compressed normal picture on the top 2/3 of the screen and a 5 or 10 meter (10 or 20 feet) wide layer in contact with the bottom is expanded onto the bottom 1/3 of the screen. This mode is useful for bottom discrimination. Note that the seabed should be steadily and distinctly plotted in red or reddish-brown. Adjust the gain if necessary.

Note: The zoom marker can be turned on/off on the system menu.

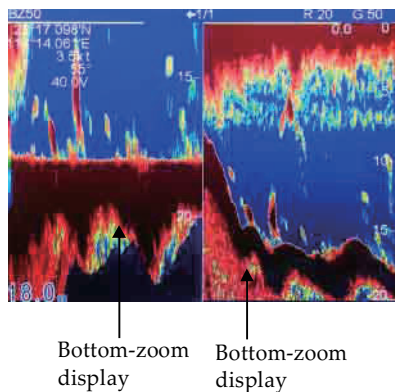


## BOTTOM ZOOM

This mode expands bottom and bottom fish echoes two to five times to vertical size of the screen, and it is useful for determining bottom hardness. A bottom displayed with a short echo tail usually means it is a soft, sandy bottom. A long echo tail means a hard bottom.

The zone automatically moves so that the bottom echoes locate on the lower half of the screen.

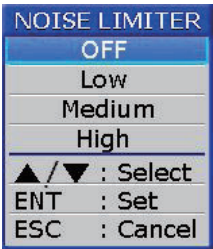
Note: The zoom marker can be turned on/off on the system menu.



### 11.7.3 Noise limiter

Light-blue dots may appear over most of the screen. This is mainly due to unclean water or noise. This noise can be suppressed by adjusting Clutter on the menu.

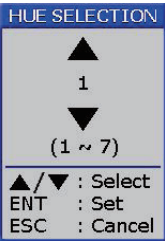
1. Press [MENU] key in **SOUNDER** screen.
2. Choose **Sonar menu** and then press [ENT] key to select.
3. Choose **Noise limiter** and then press [ENT] key. The following window will appear.



4. Choose "Off" , "Low" , "Medium" or "High" as desired and then press [ENT] key to finish.

### 11.7.4 Hue Selection

1. Press [MENU] key in **SOUNDER** screen.
2. Choose **Sonar menu** and then press [ENT] key to select.
3. Choose **Hue Selection** and then press [ENT] key. The following window will appear.

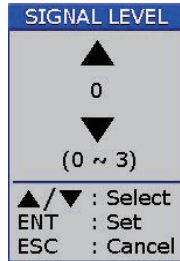


Hue Ho.	Background color	Echo color
1	Blue	7 colors, bottom reddish-brown
2	Blue	6 colors, bottom red
3	Black	7 colors, bottom reddish-brown
4	Black	6 colors, bottom red
5	White	7 colors, bottom reddish-brown
6	White	6 colors, bottom red
7	Black	Monochrome yellow, 8 intensities

4. Press the [▲] or [▼] key to select the background and press [ENT] key to finish.

### 11.7.5 Signal level

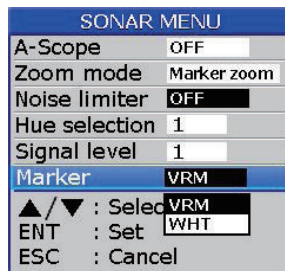
1. Press [MENU] key in **SOUNDER** screen.
2. Choose **Sonar menu** and then press [ENT] key to select.
3. Choose **Signal level** and then press [ENT] key. The following window will appear.



4. Press the [▲] or [▼] key to select the signal level and press [ENT] key to finish.

### 11.7.6 Marker

1. Press [MENU] key in **SOUNDER** screen.
2. Choose **Sonar menu** and then press [ENT] key to select.
3. Choose **Marker** and then press [ENT] key. The following window will appear.



4. Choose "VRM" or "WHT" as desired and then press [ENT] key to finish.

The white marker functions to display a particular echo color in white. For example, you may want to display the bottom echo (reddish-brown) in white to discriminate fish echoes near the bottom. Note that the bottom must be displayed in reddish-brown for the white marker to function.

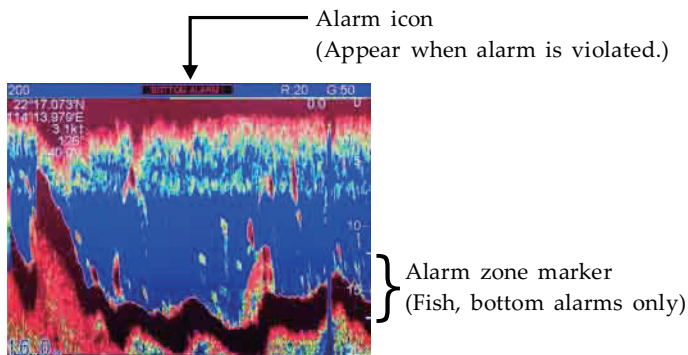


## 11.8 Alarm

1. Press [MENU] key in **SOUNDER** screen.
2. Choose **ALARM** and then press [ENT] key. The following window will appear.

ALARM	
Bottom	OFF
From	0
Span	0
Fish	OFF
From	0
Span	0
Temperature	OFF
From	0
Span	0
▲/▼ : Select	
ENT : Set	
ESC : Cancel	

3. Press [▲] or [▼] key to select an alarm.
4. Press [ENT] key to select "OFF", "ON", "IN" or "OUT". (For the water temperature alarm, select "IN" to get the alarm when the water temperature is within the alarm zone range, or "OUT" to get the alarm when the water temperature is higher than the alarm zone range.)
5. Choose From then press [ENT] key to adjust alarm starting depth. Press [▲] or [▼] to adjust value.
6. Choose Span then press [ENT] key to adjust alarm range. Press [▲] or [▼] to adjust value.



7. To deactivate an alarm, select "OFF" at step 4 in the above procedure.

## 11.9 System Menu

1. Press [MENU] key in **SOUNDER** screen.
2. Choose **System menu** and then press [ENT] key. The following window will appear.

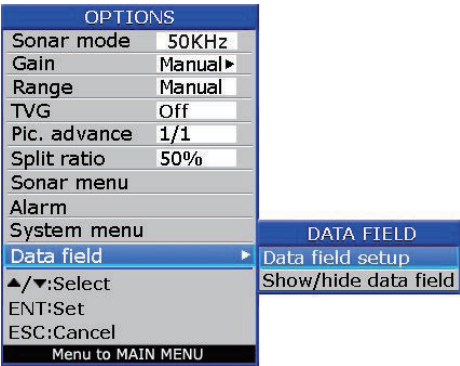
SYSTEM MENU	
Zoom marker	OFF
F/A level	Weak
Range 1	5
Range 2	10
Range 3	20
Range 4	40
Range 5	80
Range 6	150
Range 7	200
Range 8	300
Range 9	600
Range 10	1000
Zoom range	x2
B/L range	5 m
Temp	°C
▲/▼ : Select	
ENT : Set	
ESC : Cancel	

**RANGE 1- 10:** Activates or deactivates specific range scales. Default ranges are 5, 10, 20, 40, 80, 150, 200, 300, 600, and 1000 (meters). Setting area is 2m to 800m.

**Note:** Ranges must be set in numerical order. For example, if range 1 is 5 m and range 3 is 20m, range 2 should be between 6 and 19 m.

11.10 Data field

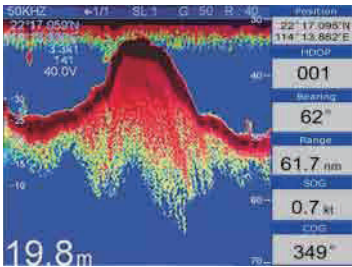
- 1. Press [MENU] key in **SOUNDER** screen.
- 2. Choose **Data field** and then press [ENT] key. The following window will appear.



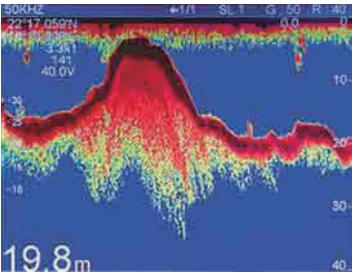
3. Data field setup

The Data Field will appear on the right-side of the screen. The black area is the data area of which may be changed.

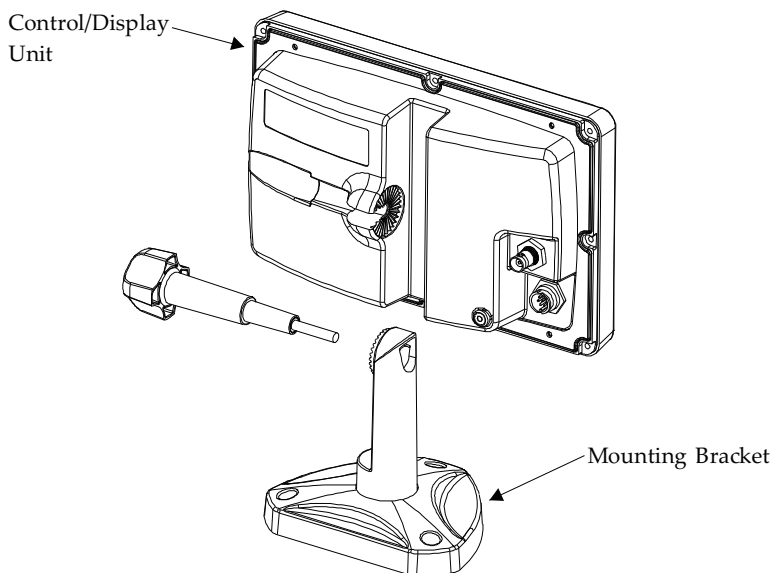
- Press [ENT] key and a data table will appear.
- Press the [◀], [▶], [▼] or [▲] key to select the one you want to display on the data field, then press [ENT] to finish.



4. User can **Show/hide data field** as desired.



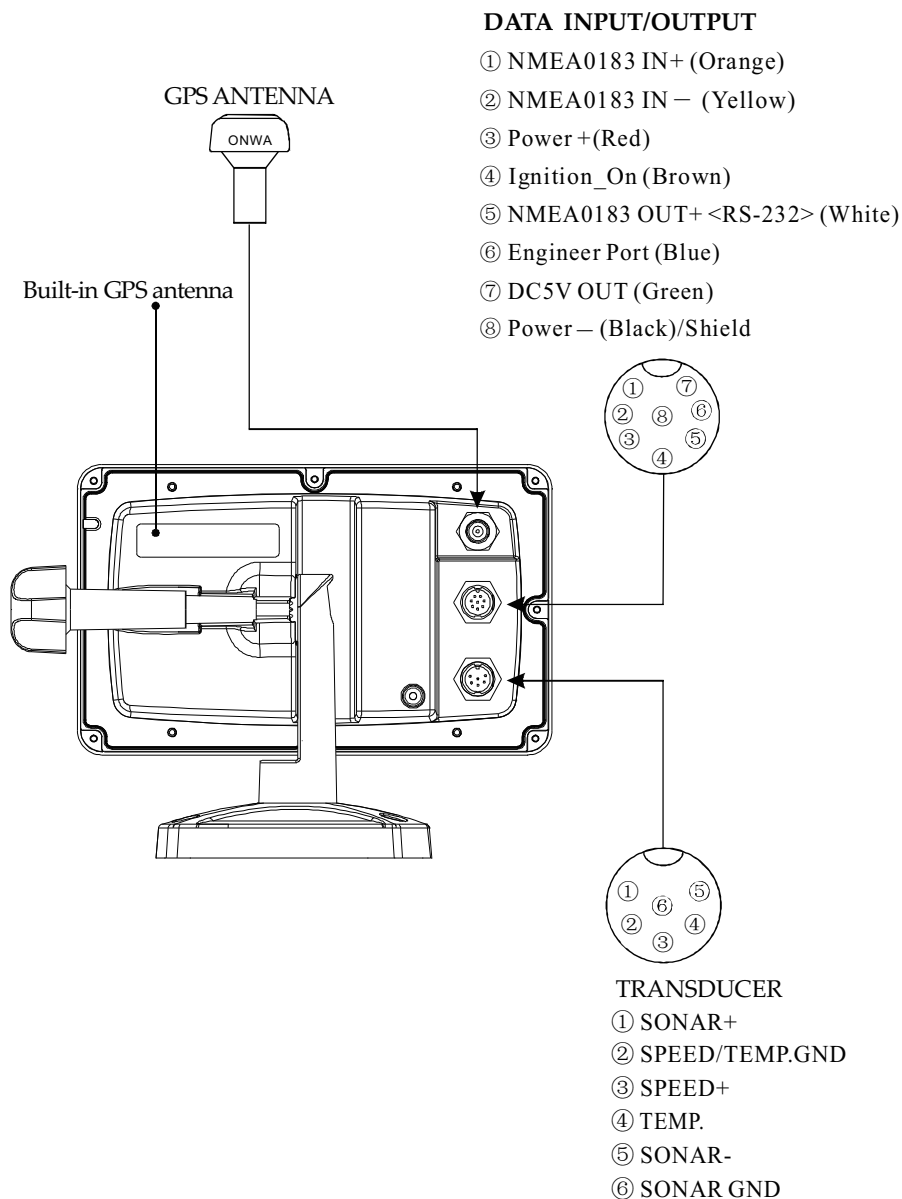
## 12. INSTALLATION



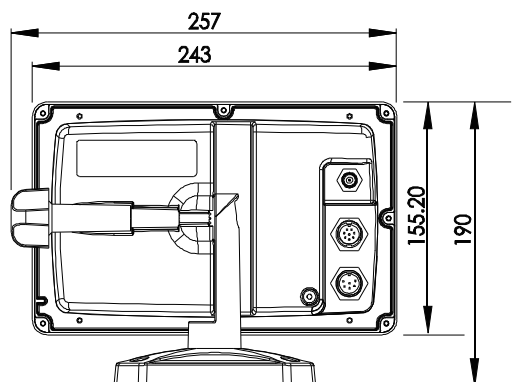
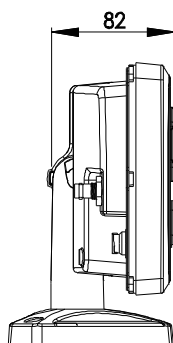
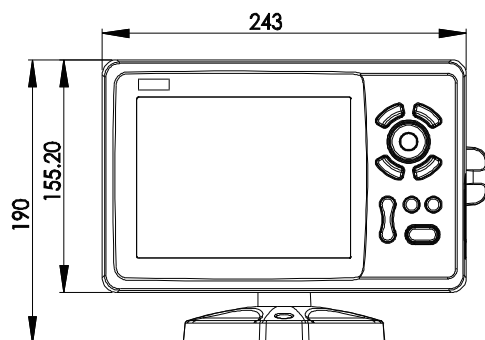
Notice: The unit should be mounted on a flat, solid surface for maximum stability. Be sure to fix the mounting bracket with screws. Otherwise, the display unit may fall down by the boat's pitching and rolling to the lead to the fire or the injury.

- (1) The mounting bracket should be fixed with 6mm screws.
  - Do not install the unit at the places that are affected by vibration or might be affected with spray or rain.
  - Avoid the places where there is sunlight because visibility might be limited and the unit will be exposed to heat too much.
  - Be sure that the space between the rear side of the unit and the wall is more than 10cm.
- (2) Fix the unit to the mounting bracket firmly with the knobs so as to prevent it to get out of the bracket while running.

# 13. INTERCONNECTION DIAGRAM



## 14. DISPLAY SIZE





## 15. SHORTCUTS

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### Shortcuts in Plotter screen

- 1) Press and hold [MODE] to change the track color.
- 2) Press and hold [ESC] to turn track record on and off.
- 3) Press and hold [ENT] to activate the User Mark drawing function.

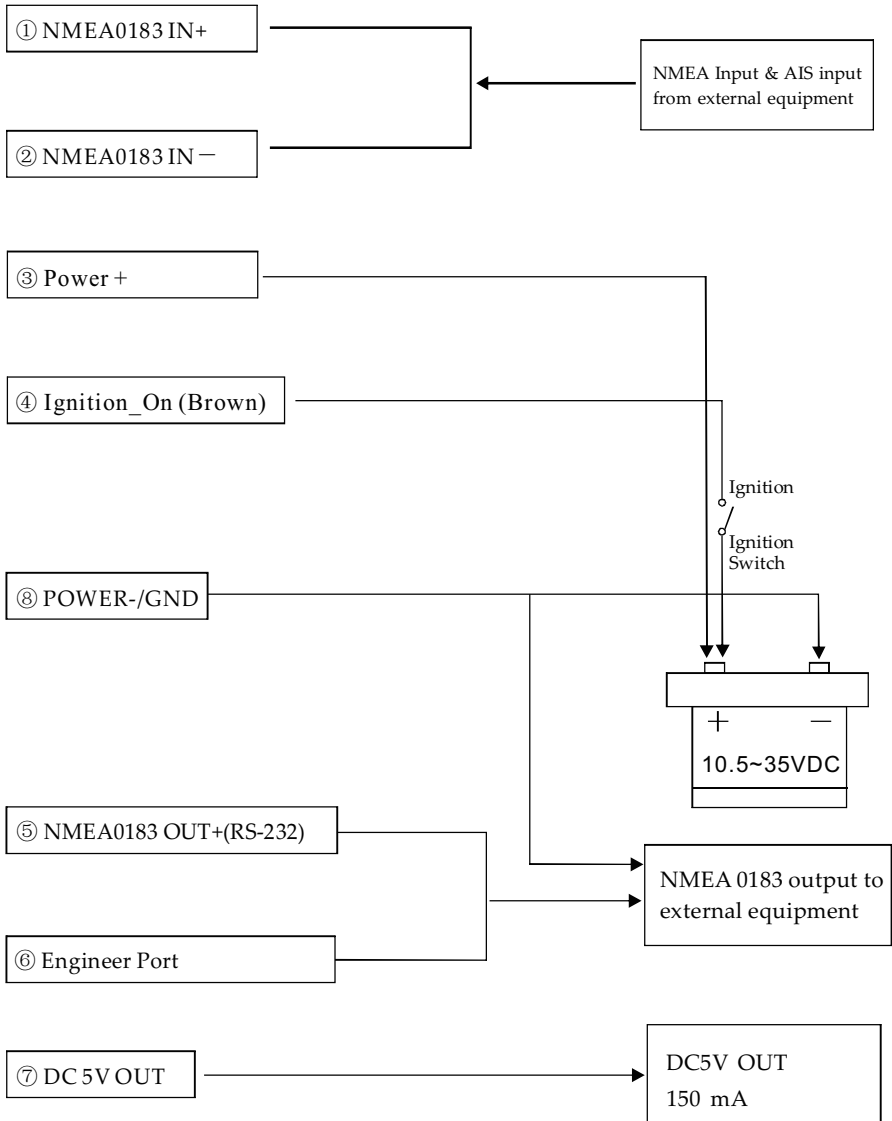
### Shortcuts in Fishfinder (Sounder) screen

- 1) Press and hold [MODE] to change the Sonar mode, 50KHz, 200KHz, DUAL, 50KHz/ZOOM and 200KHz/ZOOM.
- 2) Press and hold [ENT] key to switch between Auto and Manual gain.
- 3) On manual gain slightly press [ENT] key to adjust manual gain.
- 4) On auto gain slightly press [ENT] key to switch between Auto-1 and Auto-2 mode.
- 5) Press and hold either [  ] or [  ] key to switch between Auto and Manual range.
- 6) Slightly press [F] key to change Signal Level.
- 7) Press and hold [▶] key to adjust picture advance speed.
- 8) Slightly press [◀] [▶] key to shift range.
- 9) Slight press [▲] [▼] key to move VRM.

### Shortcuts in Plotter/Sounder mode

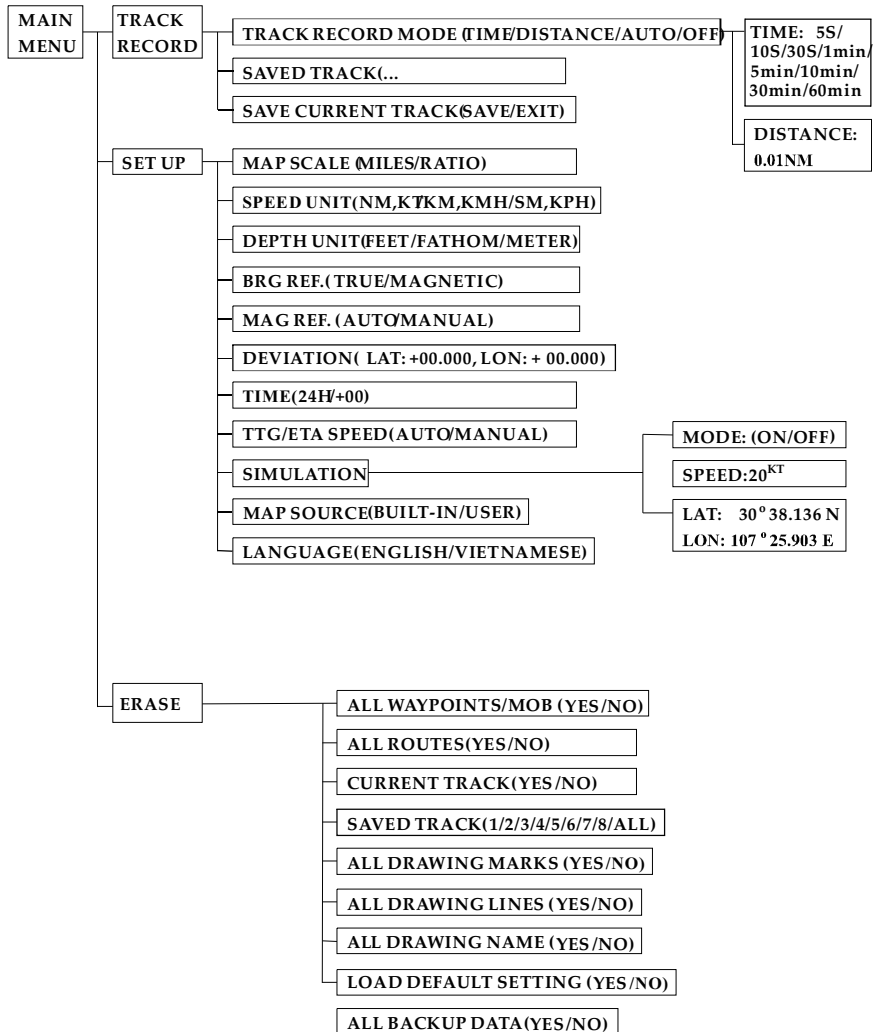
- 1) Press and hold [MENU] key to change the **PLOTTER** and **SOUNDER** screen split ratio.
- 2) When **SOUNDER** screen is  $\geq 50\%$ , all key functionalities are the same as in **SOUNDER** screen only.
- 3) When **PLOTTER** screen is  $>50\%$  all key functionalities are the same as in **PLOTTER** screen only.

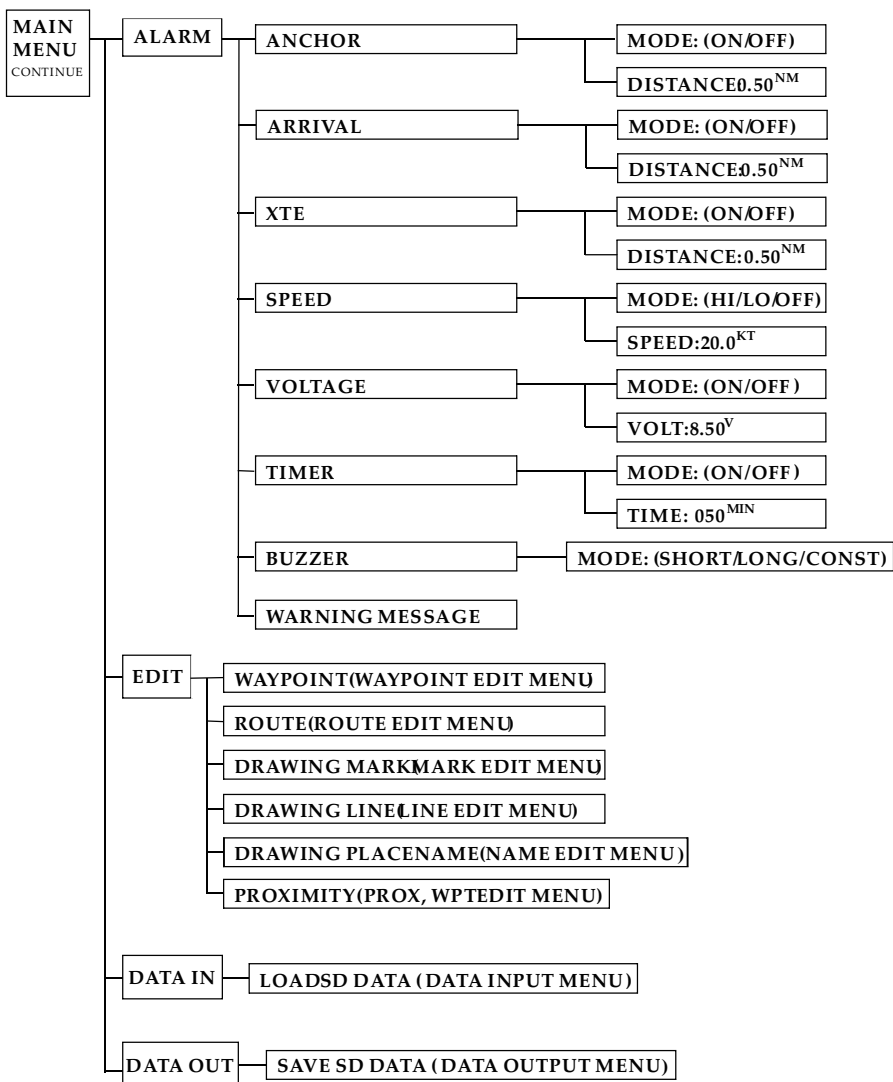
## 16. DATA IN/OUT DESCRIPTION

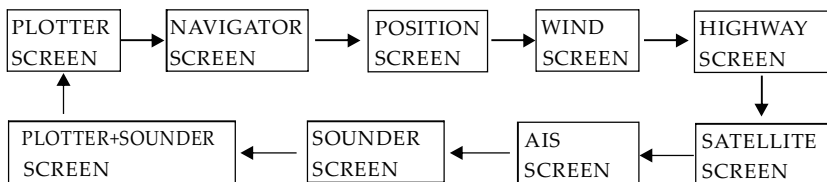
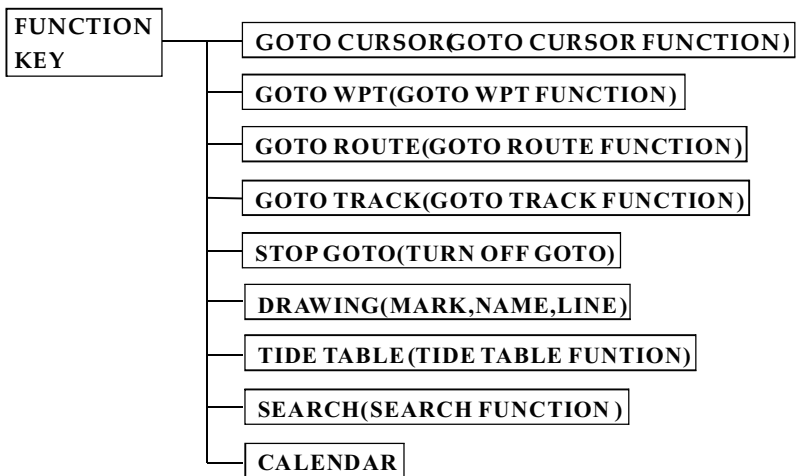


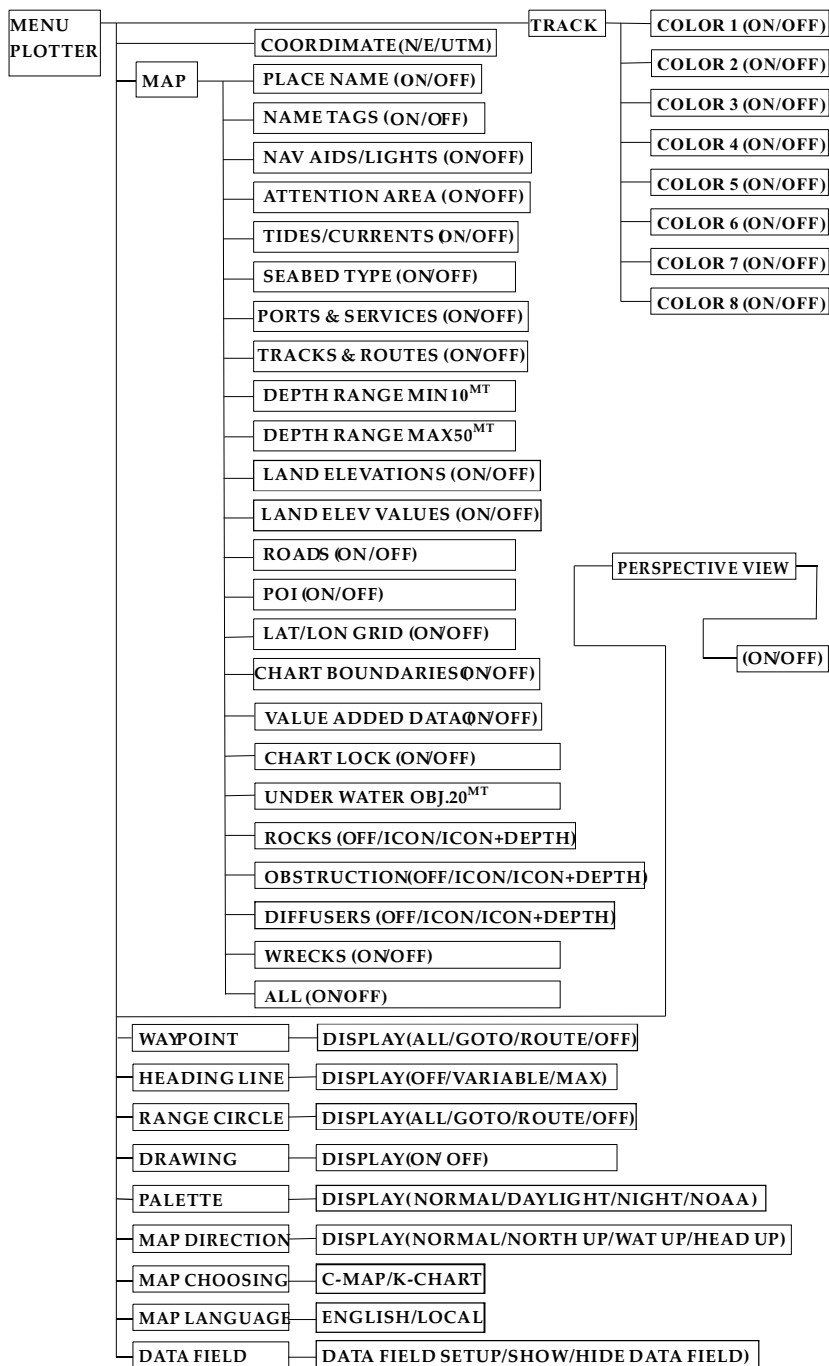


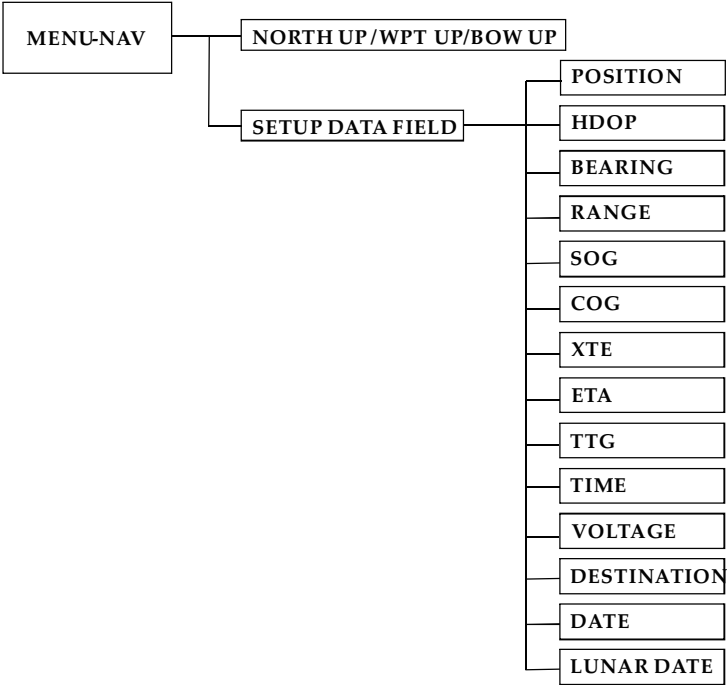
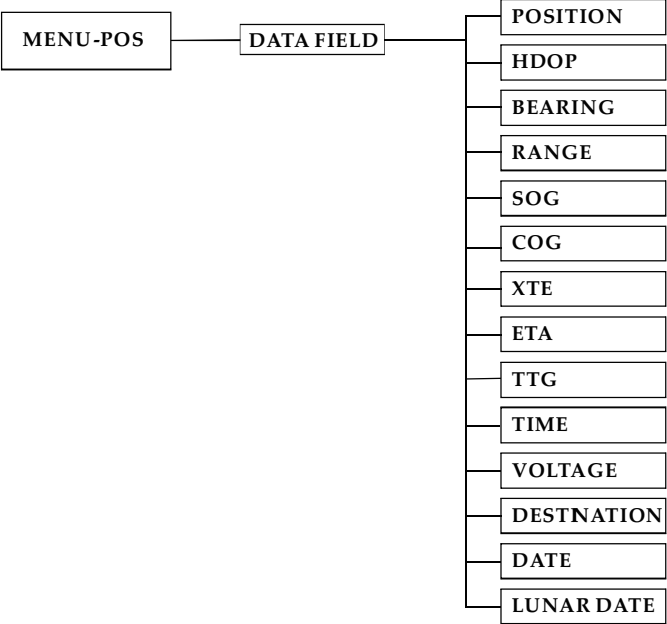
# 17. MENU TREE

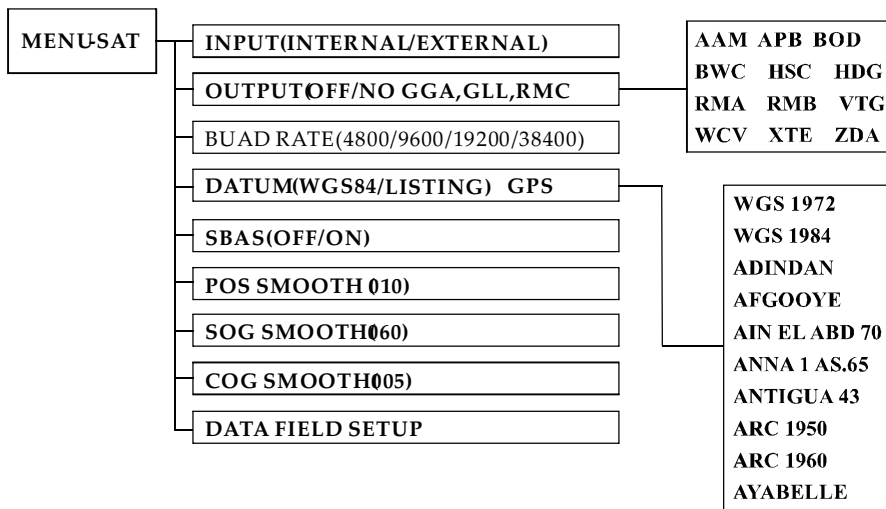
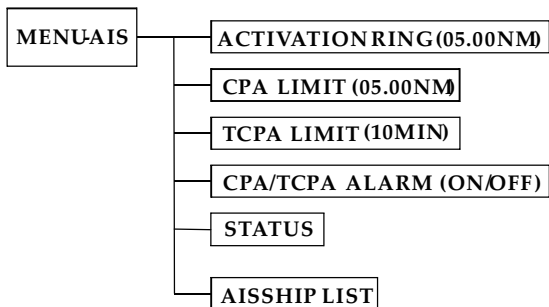












## 18. ABBREVIATIONS

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Abbreviations	Word
ESC	Escape
ENT	Enter
SBAS	Satellite-based augmentation system
POS	Position
SOG	Speed Over Ground
COG	Course Over Ground
AWS	Apparent Wind Speed
AWA	Apparent Wind Angle
TWS	True Wind Speed
TWA	True Wind Angle
TWD	True Wind Direction
VMG	Velocity Made Good
INFO	Information
LAT	Latitude
LON	Longitude
TTG	Total Time to Go
ETA	Estimate Time of Arrival
XTE	Cross Track Error
HDOP	Horizontal Dilution of Precision
TVG	Time Variable Gain
PIC	Picture
B/L	Bottom Lock
F/A	Fish Alarm
MAG.VAR.	Magnetic Variation

## 19. GLOSSARY

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ACA	(AIS) Regional Assignment Channel Assignment Message
ACK	Acknowledgement
ACS	(AIS) Channel management information source messages
AFSK	Auto frequency-shift keying
ALR	(AIS) Alarm Message
A to N	Aid to Navigation
AIS	Automatic Identification System
BIIT	Built In Integrity Testing
BNC	Bayonet fitting type Therefore connector
COG	Course over Ground
CR	Carriage Return
CS	Carrier Sense
CSTDMA	Carrier Sense Time Division Multiple Access
DC	Direct Current
DGNSS	Differential Global Navigation Satellite System
DSC	Digital Selective Calling
GLONASS	Global Navigation Satellite System
GNSS	Global Navigation Satellite System
GMSK	Gaussian Minimum Shift Keying
GPS	Global Positioning Satellite / System
HF	High Frequency
IMO	International Maritime Organization
IEC	International Electro technical Commission
LED	Light Emitting Diode
LF	Line Feed
LNA	Low-noise Amplifier
MF	Medium Frequency
MKD	Minimum Keypad and Display



MMSI	Maritime Mobile Service Identity
MPE	Maximum Permissible Exposure
NMEA	National Marine Electronics Association
PC	Personal Computer
PI	Presentation Interface
RF	Radio Frequency
RTCM	Radio Technical Commission for Maritime Services Commission
RX	Receive or Receiver
RFI	Radio Frequency Interference
SAR	Specific Absorption Rate
SELV	Separated Extra Low Voltage
SMS	Short Message System
SOG	Speed over Ground
SRM	Safety Related Message
TDMA	Time-division Multiple Access
TNC	Threaded type RF connector
TX	Transmit or Transmitter
UTC	Universal Time Co-ordinated
VDM	(AIS) VHF Data Link Messages
VDO	(AIS) VHF data link own vessel messages
VHF	Very High Frequency
VSWR	Voltage Standing Wave Ratio

